Sec. [1] - Second Term - Algebra - Final Revision - Math

[A] : Choose The Correct Answer : -

1	The order of the matrix $A = \begin{pmatrix} 1 & 3 & 5 & 7 \end{pmatrix}$ is .... (a) 1×3 (b) 1×4 (c) 1×5 (d) 1×7	B
2	The type of the matrix $\begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix}$ is = ... (a) row matrix (b) column matrix (c) square matrix (d) zero matrix	B
3	If : the matrix A of order 3×2 , then number of elements of A is .... (a) 3 (b) 1 (c) 6 (d) 9	C
4	If the matrix A in order 3×2 then A^t in order .... (a) 3×2 (b) 3×3 (c) 2×3 (d) 2×2	C
5	If A is a matrix of order 2×3 and B is a matrix of order 3×2 , then the order of matrix $A \times B$ is .... (a) 2×3 (b) 3×2 (c) 2×2 (d) 3×3	C
6	If the matrix A is of order 2×3 and the matrix B^t is of order 1×3 , then the matrix AB is of order .... (a) 3×3 (b) 3×1 (c) 2×1 (d) 1×2	C
7	If A is a matrix of order 1×3 and B is a matrix of order 3×2 , then the order of $A \times B$ is .... (a) 2×1 (b) 1×2 (c) 3×2 (d) 2×3	B
8	The value of $\begin{vmatrix} 2 & 5 \\ 1 & -1 \end{vmatrix}$ is .... (a) 7 (b) -7 (c) ± 7 (d) 3	B
9	If the matrix A is symmetric then $A + A^t =$ .... (a) A^2 (b) 2 A (c) 0 (d) -1	B

10	If : $\begin{vmatrix} 2x & 2 \\ 4 & 3 \end{vmatrix} = 10$, then $x =$ .... (a) 2 (b) 3 (c) 4 (d) 5	B
11	If : $\begin{vmatrix} x^2-9 & 1 \\ 0 & 1 \end{vmatrix} =$ zero then $x =$ .... (a) 3 (b) -3 (c) ± 3 (d) 9	C
12	If : A is a matrix of order 1×3 , B^t is another matrix of order 1×3 , then which of the following operation can be found out .... (a) $A + B$ (b) $B^t + A^t$ (c) AB^t (d) AB	D
13	It could be finding the product of the two matrices A and B if they are in order .... (a) $m \times n$, $n \times \ell$ (b) $n \times m$, $n \times \ell$ (c) $m \times n$, $\ell \times n$ (d) $n \times m$, $\ell \times n$	A
14	If : $A = \begin{pmatrix} x^2-1 & 8 \\ 3 & 1 \end{pmatrix}$ has a multiplicative inverse , then $x \in$ .... (a) $\mathbb{R}$ (b) $\mathbb{R} - \{5\}$ (c) $\mathbb{R} - \{-5 , 5\}$ (d) $\{-5 , 5\}$	C
15	If : $\begin{pmatrix} 3 & 2 \\ 1 & 5 \end{pmatrix} \times \begin{pmatrix} x & -2 \\ -1 & 3 \end{pmatrix} = 13\,I$, then $x =$ .... (a) 5 (b) 15 (c) 13 (d) 4	A
16	If the matrix $\begin{pmatrix} a & 8 \\ 2 & a \end{pmatrix}$ has no multiplicative inverse , then : .... (a) $a = 4$ (b) $a = \pm 4$ (c) $a \in \mathbb{R} - \{4\}$ (d) $a \in \mathbb{R} - \{\pm 4\}$	B
17	The point lying in the solution region of the inequality $x + y \le 2$ is .... (a) $(1 , 3)$ (b) $(2 , -3)$ (c) $(2 , 3)$ (d) $(1 , 4)$	B
18	The point which lying in the solution region of the inequality $x + y \le 3$ is .... (a) $(1 , 3)$ (b) $(2 , -3)$ (c) $(2 , 2)$ (d) $(1 , 4)$	B
19	The point which belongs to the solution set of the following inequalities : $x + y \ge 3$ in $\mathbb{R} \times \mathbb{R}$ is .... (a) $(1 , 1)$ (b) $(1 , -2)$ (c) $(3 , 2)$ (d) $(-3 , 3)$	C

20	If the point $(2, a) \in$ the solution set of the inequality $y \geq 2x + 3$, then $a =$ .... (a) 1 (b) -7 (c) 7 (d) -1	C
21	The point $(1, -3)$ satisfy the inequality .... (a) $2x - y > -3$ (b) $2x - y < -3$ (c) $x + y > 4$ (d) $x + y > 0$	A
22	The point $(-3, 2)$ lies in the region of solution of the inequality .... (a) $y < x$ (b) $y \geq x$ (c) $y \leq x$ (d) $y \geq -x$	B
23	If : $x > 0$ and $y > 0$ the solution set in the .... (a) 1^{st} quad. (b) 2^{nd} quad. (c) 3^{rd} quad. (d) 4^{th} quad.	A
24	The point which belongs to the S.S of the following inequalities is : $x > 0, y > 1, x + y \leq 3$ (a) $(3, 1)$ (b) $(1, 2)$ (c) $(3, 2)$ (d) $(1, 3)$	B
25	The point which belongs to the S.S. of the following inequalities $x \geq 3, y \geq 0, x + y > 3$ is .... (a) $(2, 1)$ (b) $(3, 2)$ (c) $(-3, 4)$ (d) $(1, 3)$	B
26	The point which belongs to the S.S. of the two inequalities : $x > 1, x + y < 4$ is .... (a) $(1, 2)$ (b) $(2, 2)$ (c) $(2, 1)$ (d) $(4, 0)$	C
27	The point which belong to the solution set of the following inequalities .... $x > 2, y > 1, x + y \geq 3$ is (a) $(3, 1)$ (b) $(1, 2)$ (c) $(3, 2)$ (d) $(1, 3)$	C
28	The point which belongs to the solution set of the inequalities $x \geq 0, y \geq 0$ $, 2x + y < 4, x + 3y < 6$ .... (a) $(1, -3)$ (b) $(3, 0)$ (c) $(2, 3)$ (d) $(1, 1)$	D
29	The point which belongs to the region of solution of the system of the inequalities $x \geq 0, y \geq 0, x + 3y < 6$ and $2x + y < 4$ is .... (a) $(1, -3)$ (b) $(3, 0)$ (c) $(2, 3)$ (d) $(1, 1)$	D

[B] : Complete the Following : -

1	If the order of matrix A is 3×2 , then the order of A^t is ....
2	If matrix A of order $m \times n$ then A^t of order ....
3	If A is a matrix of order 2×3 , B^t is a matrix of order 1×3 , then AB is a matrix of order ....
4	If : $A = \begin{pmatrix} 2 & -3 \\ 1 & 4 \end{pmatrix}$, then $A^t =$ ....
5	If : $A = \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}$, then $A^t =$ ....
6	The transpose of the matrix $\begin{pmatrix} -3 & 4 \\ 2 & -1 \end{pmatrix}$ is ....
7	The value of the determinant of $\begin{pmatrix} 2 & 3 \\ 7 & 5 \end{pmatrix} =$ ....
8	The value of the determinant $\begin{vmatrix} 2 & 4 & 5 \\ 0 & -3 & 7 \\ 0 & 0 & 1 \end{vmatrix} =$ ....
9	The value of : $\begin{vmatrix} 1 & 0 & 0 \\ 3 & 5 & 0 \\ 2 & 1 & 4 \end{vmatrix} =$ ....
10	The value of $\begin{vmatrix} -1 & 0 & 0 \\ 2 & -4 & 0 \\ 5 & -1 & 2 \end{vmatrix} =$ ....
11	If : $A = \begin{pmatrix} 2 & 3 & -2 \\ 4 & 5 & 8 \end{pmatrix}$, $B = \begin{pmatrix} 3 & 4 & 5 \\ 1 & 2 & -3 \end{pmatrix}$, then : $A - B =$ ....
12	The multiplicative inverse of the matrix $A = \begin{pmatrix} 1 & 0 \\ 3 & 1 \end{pmatrix}$ is ....

13	If : $A=\begin{pmatrix} 3 & -4 \\ 9 & 0 \\ 2 & 6 \end{pmatrix}$, $B=\begin{pmatrix} x-1 & -4 \\ 9 & 0 \\ 2 & 6 \end{pmatrix}$ and $A = B$, then $x =$ ....
14	If : $A + A^t = 0$, then A is ....
15	If : $\begin{pmatrix} x \\ 2 \end{pmatrix} + \begin{pmatrix} 1 \\ y \end{pmatrix} = \begin{pmatrix} 6 \\ 7 \end{pmatrix}$, then : $x =$ .... , $y =$ ....
16	If : $\begin{pmatrix} x+8 & -5 \\ 3 & -y \end{pmatrix} = \begin{pmatrix} 38 & -5 \\ 3 & 4y-10 \end{pmatrix}$, then $x =$ .... , $y =$ ....
17	Does the matrix $\begin{pmatrix} 0 & 1 & 2 \\ -1 & 0 & -3 \\ -2 & 3 & 0 \end{pmatrix}$ is symmetric or skew symmetric ....
18	If : $A=\begin{pmatrix} 3 & 1 \\ 6 & 2 \end{pmatrix}$, $B=\begin{pmatrix} 0 & 4 \\ 2 & 6 \end{pmatrix}$, then $AB =$ ....
19	If : $A=\begin{pmatrix} 2 \\ -2 \end{pmatrix}$, $B=\begin{pmatrix} 2 & 5 \end{pmatrix}$, then $BA =$ ....
20	If : $A=\begin{pmatrix} 3 & -2 \\ -3 & 2 \end{pmatrix}$, then $A^2 - 5A =$ ....
21	If.: $A=\begin{pmatrix} 1 & 2 \\ 3 & -2 \end{pmatrix}$, then $A^2 =$ ....
22	If : $A=\begin{pmatrix} 2 & 3 \end{pmatrix}$, $B=\begin{pmatrix} a & 0 \\ 1 & b \end{pmatrix}$ and $AB=\begin{pmatrix} 7 & 3 \end{pmatrix}$, then $a =$ .... , b ....
23	If : $A=\begin{pmatrix} x & -2 \\ -9 & 2x \end{pmatrix}$, has no multiplicative inverse then $x =$ ....
24	Using determinant the area of ΔABC where $A = (-2, -2)$, $B = (3, 1)$, $C = (-4, 3)$ is ....

25	If : A (8 , 5) , B (0 , 6) , C (0 , 0) then the area of a triangle ABC equals .... square units.
26	(5 , 3) belongs to the solution set of the inequalities y .... 2 and x 6
27	The two points (4 , 3) and (3 , 2) belong to the S.S. of the inequality $X + y$ 5
28	The point that belongs to the solution set of the following inequalities $x > 1$, $y > 1$, $x + y \leq 5$ from the following points : (2 , 1) , (1 , 2) , (3 , 2) , (1 , 3) is ....

[C] : Essay Problems : -

1	**Find the value of the determinant :** $\begin{vmatrix} 2 & 0 & -3 \\ 5 & -1 & 4 \\ -2 & 0 & 3 \end{vmatrix}$
2	**Find the value of the following two determinants :** (1) $\begin{vmatrix} 1 & 7 & 5 \\ 3 & 0 & 1 \\ 4 & 0 & 6 \end{vmatrix}$ (2) $\begin{vmatrix} -2 & 3 & 7 \\ 0 & 4 & 5 \\ 0 & 0 & -3 \end{vmatrix}$
3	**Find the value of x which satisfy the equation :** $\begin{vmatrix} 1 & 0 & 0 \\ 1 & x & x \\ 5 & 2 & x \end{vmatrix} = 3$
4	If : $\begin{pmatrix} 2x-5 & 4 \\ 3 & 2y+12 \end{pmatrix} = \begin{pmatrix} 25 & 4 \\ 3 & y+18 \end{pmatrix}$ **Find the value of :** x and y
5	If : $A = \begin{pmatrix} 4 & 8 & -6 \\ 2 & -4 & 8 \\ 6 & 12 & 0 \end{pmatrix}$, $B = \begin{pmatrix} 2 & -6 & 2 \\ 4 & -10 & 0 \\ -1 & 8 & -4 \end{pmatrix}$ then find the matrix X where $X = 2A - 3B$
6	If : $A = \begin{pmatrix} 2 & -1 \\ -3 & 5 \end{pmatrix}$, $B = \begin{pmatrix} -1 & 4 \\ 6 & -2 \end{pmatrix}$, $C = \begin{pmatrix} 1 & -3 \\ 0 & 3 \end{pmatrix}$ **Find :** $2A - 3B + 4C$

7	If : $A=\begin{pmatrix}-4 & -1\\ -3 & -7\end{pmatrix}$, $B=\begin{pmatrix}2 & -7\\ 8 & -1\end{pmatrix}$, $C=\begin{pmatrix}7\\ 4\end{pmatrix}$ find each of the following if it is possible : (**1**) $A+B$ (**2**) $B+C$
8	If : $A=\begin{pmatrix}2 & 3\\ 1 & 0\\ 5 & 1\end{pmatrix}$, $B=\begin{pmatrix}-1 & 1 & 1\\ 3 & 2 & 1\end{pmatrix}$, **find :** A^t+B
9	If : $A=\begin{pmatrix}-3 & 1\\ 2 & 5\end{pmatrix}$, $B=\begin{pmatrix}2 & 4\\ -1 & 3\end{pmatrix}$, **prove that :** $(A+B)^t=A^t+B^t$
10	If : $A=\begin{pmatrix}3 & 1\\ 4 & 1\end{pmatrix}$, $B=\begin{pmatrix}4 & 3\\ 6 & 6\end{pmatrix}$ **find the matrix X where :** $X=A+B^t$
11	**Solve the equation :** $A^t+\begin{pmatrix}1 & -2\\ 3 & -4\end{pmatrix}=\begin{pmatrix}2 & -1\\ 0 & 5\end{pmatrix}$
12	If : $A=\begin{pmatrix}0 & 2\\ -2 & -3\\ 1 & 4\end{pmatrix}$ and $B=\begin{pmatrix}5 & 0\\ -1 & 1\end{pmatrix}$ Find AB and BA if it possible.
13	If : $A=\begin{pmatrix}1\\ 4\end{pmatrix}$, $B=\begin{pmatrix}3 & -2\end{pmatrix}$, $C=\begin{pmatrix}3 & 0\\ -6 & 5\end{pmatrix}$, then find the matrix X which satisfies the relation : $X^t=AB+C$
14	If : $A=\begin{pmatrix}2 & 1\\ 0 & -1\end{pmatrix}$, $B=\begin{pmatrix}1 & 3\\ -1 & 2\end{pmatrix}$, **Find :** A^tB
15	If : $A=\begin{pmatrix}3 & -2\\ -3 & 2\end{pmatrix}$, **prove that :** $A^2-5A=O$
16	If : $A=\begin{pmatrix}4 & 2\\ 6 & -2\end{pmatrix}$ **prove that :** $A^2-2A-20I=O$

17	If : $\begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix} \begin{pmatrix} x & 7 \\ 3 & y \end{pmatrix} = \begin{pmatrix} 7 & 8 \\ 11 & 18 \end{pmatrix}$ **find the value of :** x and y
18	If : $B = \begin{pmatrix} x & -xy \\ 0 & y \end{pmatrix}$ prove that $B^{-1} = \begin{pmatrix} \frac{1}{x} & 1 \\ 0 & \frac{1}{y} \end{pmatrix}$ **given that :** $xy \neq 0$
19	If : $A = \begin{pmatrix} -5 & 6 \\ 4 & 2 \end{pmatrix}$, **find :** A^{-1}
20	**Solve the following two equations using cramer's rule :** $x - y = 7$, $2y + 3x = 1$
21	**Solve the system of the following two equations using cramer's rule :** $2x + 3y = 8$, $x - 2y = -3$
22	Find the solution set of the following two equations using Cramer's rule : $x - 3y = -4$, $2x + y = 2$
23	**Solve the system of the following linear equations using the matrices :** $x + y = 5$, $3x - y = 3$
24	**Solve the system of the following linear equations using Cramar's rule :** $2x - 3y = 3$, $x + 2y = 5$
25	**Solve the system of the following equations using Cramer's rule :** $x + 3y - 5 = 0$, $2x = 8 - 5y$
26	**Find the solution set to of the system of the following two equations using cramer's rule :** $3x + 2y = 12$, $2x - 3y = -5$
27	**Solve the system of the following equations using Cramer's rule :** $2x - y = 10$, $4x + 3y = 10$

28	**Solve the following linear equations using the matrices :** $3x + 2y = 5$, $2x + y = 3$
29	**Solve the following two equations using Cramer's rule :** $2x - 3y = 5$, $3x + 4y = -1$
30	**Find S.S. of the two equations :** $2x + 3y = 12$, $3x - y = 8$ By using Cramer's rule.
31	**Solve the system of the following equations using cramer's rule :** $x + y + z = 6$, $2x - y + z = 3$, $x - y + 2z = 5$
32	**Solve the system of the following linear equations using Cramer's rule :** $2x + y - 2z = 10$, $3x + 2z + 2z = 1$, $5x + 4y + 3z = 4$
33	**Solve the system of the following equations using Cramer's rule :** $2x - y = 0$, $3x + z = 6$, $z - y = 1$
34	If : A (0 , 0) , B (2 , 4) , C (– 1 , 3) find the area of Δ ABC by using determinants.
35	**Using determinants prove that the points :** (3 , 5) , (4 , – 1) , (5 , – 7) are collinear.
36	Find the area of the triangle ABC in which A (0 , 2) , B (3 , 2) , C (6 , 5) by using determinants.
37	**By using determinants find the area of triangle ABC in which :** A (– 1 , – 3) , B (2 , 4) , C (– 3 , 5)
38	**Find solution set of the inequality graphically :** $3x + 5y \geq 15$
39	**Represent graphically the solution set of :** $2x - 5y \leq 10$
40	**Represent graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two inequalities :** $x - y \leq 4$ $x + 3y > -3$
41	**Represent graphically the S.S. of the inequality :** $x + y \geq 6$

42	**Represent graphically the solution set of the inequality :** $y < 2x + 3$
43	**Find the solution of the following system of linear inequalities graphically :** $y \le x$, $y \ge x + 1$
44	**Represent graphically the solution set of the following inequalities :** $x \ge 0$, $y \ge 0$, $x + y \le 4$
45	**Find graphically the solution set of the inequalities :** $x + y \le 1$, $x \ge 0$, $y \ge 0$ simultaneously.
46	**Solve the system of the following inequalities graphically :** $y > 2x - 1$, $y \le 2$
47	**Solve the system of the following inequalities graphically :** $y \ge 2x + 6$, $y + 3x < -1$
48	**Solve the system of the following inequalities graphically :** $x - 2y < 4$, $2x + y < 2$
49	**Solve the system of the following linear inequalities graphically :** $y \ge 2x + 6$, $y + 3x < -1$
50	**Solve the system of the following inequalities graphically in $\mathbb{R} \times \mathbb{R}$:** $x \ge 0$, $y \ge 0$, $2x + y \le 6$, $x + y \le 4$
51	**Represent graphically the solution set of the following inequalities :** $x \ge 0$, $y \ge 0$, $y \ge 2x - 2$, $y \le -x + 8$, shade the solution region.
52	**Determine the S.S. of the following inequalities :** $x \ge 0$, $y \ge 0$, $x + 2y \le 8$ and $3x + 2y \le 12$
53	Represent the following system graphically $x + y \le 5$, $y \ge 1$, $x \ge 2$, then find the point that satisfies the objective function $P = 2x + 3y$ as small as possible.

54	**Find the maximum value of the function $p = 3x + 2y$ under the restrictions :** $x \geq 0$, $y \geq 0$, $x + y \leq 8$, $y \geq 3$
55	Use the linear programing to find the values of x , y which make the value of function $p = 3x + 2y$ the maximum value under restriction : $x \geq 0$, $y \geq 0$, $x + y \leq 8$, $y \geq 3$
56	Find the maximum value of the objective function $R = 3x + 6y$ under the restrictions $x \geq 0$, $y \geq 0$, $x + 2y \leq 8$ and $2x + y \leq 6$
57	**Find the minimum value of objective function :** $R = 2x + 3y$ under the restrictions $x + y \geq 4$, $3x + y \geq 6$, $x \geq 0$, $y \geq 0$
58	**Find the minmum value of the function $P = 3x + 2y$ under the restrictions** $x \geq 0$, $y \geq 0$, $x + y \geq 4$, $3x + y \geq 6$
59	**For finding the maximum value of the function :** $P = 3x + 2y$ under conditions $x \geq 0$, $y \geq 0$, $x + y \leq 8$, $y \geq 3$ the vertices of the solution region are A (0 , 8) , B (5 , 3) , C (0 , 3) , find the maximum value of the function and the values of x and y satisfy that.
60	A factory produced two kinds of sweet. The unit of the first kind requires 200 gm. of corn flour , 25 gm. of sugar. The second kind requires 100 gm. of corn flour and 50 gm of sugar. If the allowed quantity of flour is 4 kg. and of sugar is 1250 gm. Find the maximum number of units can be produced.
61	One of the sea food shop sells two types of cooked fish A and B , and the requests from the shop owner are not less than 50 fish , as he does not consume more than 30 fish from the type (A) , or more than 35 fish from type (B) If the price of a fish from type A is 4 pounds and 3 pounds from type B . How much fish from each of the two types A and B must be used to achieve the lowest cost possible to buy?

Sec. [1] - Second Term - Trig. - Final Revision - Math

[A] : Choose The Correct Answer : -

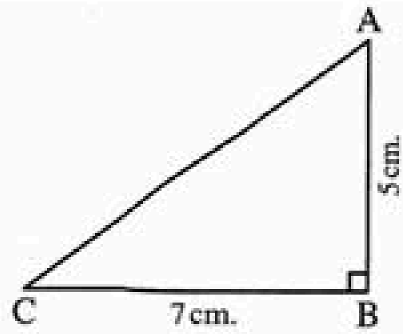
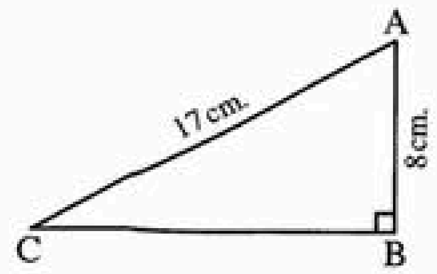
1	$2\sin^2\theta + 2\cos^2\theta$ equals .... (a) $2\sin^2\theta$ (b) $2\cos^2\theta$ (c) 1 (d) 2	C
2	The value of : $4\cos^2\theta + 4\sin^2\theta =$ .... (a) 4 (b) 8 (c) 16 (d) 1	A
3	$\sin^2 5x + \cos^2 5x =$ .... (a) 1 (b) 5 (c) 25 (d) 10	A
4	The simplest form of $\sin^2\varnothing + \cos^2\varnothing - \csc^2\varnothing$ is .... (a) 0 (b) 1 (c) $-\cot^2\varnothing$ (d) $\tan^2\varnothing$	C
5	$\sin^2 x + \cos^2 x + \tan^2 x =$ .... (a) 1 (b) $\cot^2 x$ (c) $\sec^2 x$ (d) $\csc^2 x$	C
6	$\sin^2 72° + \sin^2$ .... $° = 1$ (a) 72 (b) 90 (c) 18 (d) 0	C
7	If : $\tan^2 x = 7$, then $\sec^2 x =$ .... (a) 6 (b) 7 (c) 8 (d) 49	C
8	$\sec^2\theta - \tan^2\theta =$ .... (a) 1 (b) -1 (c) $\sin^2\theta$ (d) $\cos^2\theta$	A
9	$\tan^2\theta - \sec^2\theta =$ .... (a) 1 (b) 0 (c) -1 (d) otherwise	C
10	$1 + \cot^2\theta =$ .... in the simplest form : (a) $\sin^2\theta$ (b) $\cos^2\theta$ (c) $\sec^2\theta$ (d) $\csc^2\theta$	D
11	$(\sin\theta + \cos\theta)^2 - 2\sin\theta\cos\theta =$ .... in the simplest form. (a) $2\sin\theta\cos\theta$ (b) 1 (c) 2 (d) $\sin^2\theta - \cos^2\theta$	B

12	If : $0° \le \theta < 360°$, $\sin\theta - 1 = 0$, then : $\theta =$ .... (a) $0°$ (b) $90°$ (c) $180°$ (d) $270°$	B
13	$\frac{(1-\sin^2 x)(1-\cos^2 x)}{\tan^2 x} =$ .... (a) $\cos x$ (b) $\cos^2 x$ (c) $\cos^4 x$ (d) $\sin^2 x$	C
14	If : $0° < \theta < 360°$, $\sin\theta + 1 =$ zero then $\theta =$ .... (a) $0°$ (b) $90°$ (c) $180°$ (d) $270°$	D
15	If : $0° \le \varnothing < 360°$ and $\sin\varnothing + 1 = 0$, then $\varnothing =$ .... (a) $0°$ (b) $90°$ (c) $180°$ (d) $270°$	D
16	The general solution of the equation : $\cos\theta = 1$ is .... (a) $n\pi$ (b) $2n\pi$ (c) $\frac{\pi}{2} + n\pi$ (d) $\frac{\pi}{2} + 2n\pi$	B
17	$\frac{\tan\theta \cot\theta}{\sec\theta} =$ .... (a) $\sin\theta$ (b) $\cos\theta$ (c) $\sec\theta$ (d) $\csc\theta$	B
18	The simplest form of the expression $\sin(90° - \theta)\csc(180 - \theta)$ equals .... (a) -1 (b) 1 (c) $\tan\theta$ (d) $\cot\theta$	D
19	The simplest form of : $\cos\left(\frac{\pi}{2} - \theta\right)\sec\left(\frac{\pi}{2} - \theta\right)$ is .... (a) -1 (b) $\cot\theta$ (c) $\tan\theta$ (d) 1	D
20	The expression $\cos(90° - \theta)\sec(90° - \theta)$ in the simplest form equals .... (a) 1 (b) -1 (c) $\sin^2\theta$ (d) $\cos^2\theta$	A
21	$\sin\theta\csc\theta + 2\cos\theta\sec\theta + 3\tan\theta\cot\theta =$ .... (a) 1 (b) 3 (c) 5 (d) 6	D
22	The perimeter of circular sector 28 cm , the radius of its circle 8 cm , the length of its arc = ... cm. (a) 48 (b) 8 (c) 12 (d) 10	C

23	The area of triangle ABC where AB = 9 cm. , AC = 12 cm. and m ($\angle$ A) = 48° to the nearest two decimal is .... (a) 80.26 (b) 40.13 (c) 36.13 (d) 72.23	B
24	In triangle ABC , m ($\angle$ B) = 90° , m ($\angle$ C) = 62° , AB = 16 cm. , then BC = ... to nearest two decimal places (a) 12.18 (b) 18.12 (c) 8.51 (d) 10.82	C
25	Area of equilateral Δ with side length 6 cm. = ... cm^2. (a) 18 (b) 36 (c) $9\sqrt{3}$ (d) $6\sqrt{3}$	C
26	The area of an equilateral triangle of side length 6 cm. equal .... cm^2. (a) $6\sqrt{3}$ (b) $9\sqrt{3}$ (c) $12\sqrt{3}$ (d) $18\sqrt{3}$	B
27	Δ ABC in which : AB = 5 cm. , BC = 8 cm. , m ($\angle$ B) = 60° , then the area of Δ ABC = ... cm^2. (a) $100\sqrt{3}$ (b) 10 (c) $10\sqrt{3}$ (d) $\frac{10\sqrt{3}}{3}$	C

[B] : Complete the Following : -

1	$\sin\theta \csc\theta =$ ....
2	$1 = (\sin\theta + \cos\theta)^2 -$ ....
3	If $\sin\theta = \frac{1}{2}$, $\theta \in]0°, \pi[$, then = θ .... or ....
4	If : $\sec(-\theta) = 2$ where $\theta \in [0, 2\pi[$ then $\theta =$ .... or ....
5	If : $\theta \in [0, 2\pi[$ and $2\cos\theta - 1 = 0$, then m (θ) = ... or ....
6	If $0° < \theta < 180°$, $2\sin\theta - 1 = 0$, then $\theta =$ ....° or ....°
7	If : $\theta \in [0, \pi[$, then S.S. of the equation $\sin\theta\cos\theta - 2\cos\theta = 0$ is ....
8	The general solution of the following equation $\cos\theta = 1$ is ....

9	If $\cos(90° - \theta) = 1$ then the general solution of this equation is ....
10	The S.S of the equation $\tan\theta = \sqrt{3}$ in $]\pi, \frac{3\pi}{2}[$ is ....
11	Area of triangle ABC = $\frac{1}{2} \times AB \times BC \times$ ....
12	Area of Δ ABC in which AB = 8 cm. , AC = 6 cm. and $m(\angle A) = 60°$ is .... cm^2.
13	The surface area of the triangle ABC in which AB = 8 cm , BC = 11 cm , $m(\angle B) = 60°$ is ....
14	In triangle ABC , AB = 9 cm. , AC = 12 cm. , $m(\angle A) = 48°$, then the area ≈ .... cm^2.
15	In Δ ABC : if AB = 8 cm , BC = 6 cm , $m\angle(B) = 30°$ then area of (Δ ABC) = ...
16	ABC is a right angled at B if AC = 10 cm. , $m(\angle C) = 40°$, then AB ≃ .... cm.
17	and the radius length of its circle 4 cm. equals .... cm^2. **In the opposite figure :** $m(\angle C) =$ ....° (to the nearest degree) 
18	\6 2/ \2 6/ **From the opposite figure :** $m(\angle A) =$ ....° (to nearest degree) 
19	Area of the circular segment = ...
20	The surface area of the circular segment is ....
21	Area of the circular sector in which r = 4 cm. and its perimeter 20 cm. equals .... $cm.^2$

22	The area of circular sector whose perimeter 12 cm, and its arc length is 4 cm. equals .... cm^2.
23	The area of the circular sector whose arc length is 6 cm. and the radius length of its circle 4 cm. equals .... cm^2.
24	The circular sector which the radius length of its circle 5 cm. and the length of its arc 8 cm. whose perimeter equals .... cm.
25	Area of the circular sector whose radius length 5 cm. and its perimeter is 16 cm. equals .... cm^2.
26	The area of circular sector whose radius is 10 cm. and the measure of its angle is 1.2^{rad} = ...
27	If the length of the arc in the circular sector equal 10 cm. and the length of the diameter equals 12 cm. the perimeter of the circular sector = ...
28	The perimeter of a circular sector is 10 cm. , and the length of its arc equals 2 cm. , then its area in square centimeters equals ....
29	The area of the quadrilateral in which the lengths of its diagonals are 6 cm. and 8 cm. , and the measure of the included angle between them is 30° equals ....

[C] : Essay Problems : -

1	If : $\theta \in [0 , 2\pi[$, **find the solution set of the equation :** $2 \sin \theta \cos \theta - \sin \theta = 0$
2	**Find the solution set of the equation :** $2 \sin x + 1 = 0$ where $x =]0 , 2\pi[$
3	**Find solution set the equation :** $2 \sin \theta - \sqrt{3} = 0$ where $\theta \in]0 , 360°[$
4	**Find the general solution of the equation :** $2 \cos \theta - \sqrt{3} =$ zero
5	**Prove that :** $\dfrac{1 + \cot^2 \theta}{1 + \tan^2 \theta} = \cot^2 \theta$

6	**Prove the identity :** $\frac{\cot C}{1+\cot^2 C} = \sin C \times \cos C$
7	**Prove the validity of the identity :** $\tan\theta + \cot\theta = \sec\theta \csc\theta$
8	**Prove that :** $\tan^2\theta = \sin^2\theta + \sin^2\theta \tan^2\theta$
9	**Prove that :** $\frac{\cos^2\theta}{1-\sin\theta} = 1 + \sin\theta$
10	Prove that : $\frac{\sin\theta \cos\theta}{\tan\theta} + \frac{\tan\theta}{\sec\theta \operatorname{cosec}\theta} = 1$
11	Solve the triangle ABC which right at B , where : $m(\angle A) = 28°$, AB = 16 cm. Approximating the lengths to the nearest tenth.
12	Solve the triangle ABC whic right-angled at B where $m(\angle C) = 62°$, AB = 16 cm.
13	Solve Δ ABC in which $m(\angle A) = 90°$, $m(\angle C) = 53°$ and AB = 10 cm.
14	Solve the Δ ABC which is right-angled at B and $m(\angle C) = 62°$, AB = 16 cm. approximating the result to the nearest hundredth.
15	**Find solution of triangle ABC in which :** $m(\angle B) = 90°$, AB = 8 cm. , $m(\angle C) = 34°$
16	**Solve the right-angled triangle ABC , in which :** $m(\angle B) = 90°$, AB = 4.5 cm. and BC = 6 cm.
17	Find the area of the circular sector in which , its perimeter 12 $cm.^2$ and the length of its arc 6 cm.
18	Find surface area of the circular sector , the radius of its circle is 10 cm. and its central angle is 1.2^{rad}
19	Find the area of the circular sector in which the length of the diameter is 20 cm. and the measure the inscribed angle equals 60°

20	Find the area of the circular sector whose arc length is 10 cm. and the length of its diameter is 10 cm.
21	A circular sector whose measure of its central angle is $60°$ and the length of radius of its circle is 12 cm , find its area approximated to nearest one decimal.
22	The area of a circular sector is 100 cm^2. and the area of its circle = 100π cm^2. Find the area of the circular segment has the same arc of the sector.
23	Find the area of the circular segment in which the radius length of its circle is 12 cm. and measure of its central angle equals $60°$. (to the nearest hundredth).
24	Find the area of circular segment whose radius 8 cm. and the measure of its angle is $150°$
25	Find the area of the circular segment which the radius length of its circle is 10 cm. and the measure of its central angle is $120°$ to the nearest one decimal.
26	Find the area of the major circular segment in which the length of its chord equals the length of the radius of its circle equals 12 cm.
27	A circular segment where the radius length of its circle 6 cm. and the length of its height 3 cm. Find its area to nearet one decimal place.
28	**Find the area of the circular segment in which the length of the radius of its circle is 14 cm. and the length of its arc is 22 cm.** where $\left(\pi = \frac{22}{7}\right)$
29	Find the area of circular segment its radius = 8 cm , the measure of its angle = 150
30	A circle of radius 7 cm , a chord was drawn in it opposite to a central angle of measure $110°$ calculate the length of this chord to the nearest thousandth.
31	From the top of a tower of height 40 metres , it is found that the angle of depression of a body in the horizontal plane passing through the base of the tower = $25°$ in measure. Find the distance between the body and the base of the tower to the nearest metre.
32	From a point on the land surface at a distance 42 metres far. From the base of a minaret , a man observed the elevation angle of the top of the minaret to be $50°$ in measure. Find the height of the minaret to nearest metre.

33	From the top of a rock 180 metres high from the sea lovel , the depression angle of a boat 300 metres a part from the base of the rock was measured. What is the radian measure of the depression angle ?
34	From the top of a rock 40 metres high , two shipes were observed in one ray on the sea with the base of the rock and their depression angles were measured to be $35^\circ\ \grave{12}$ and $53^\circ\ \grave{6}$ Find the distance between the two ships.
35	A light pole of height 7.2 meters gives a shade on the ground of length 4.8 meters. Find in radian the measure of the elevation angle of the sun at that moment.
36	From a point 8 metres apart from a base of a tree , it was found that measure of elevation angle of the top of the tree was 22° find the height of the tree to the nearest hundredth.
37	Find the area of the quadrilateral in which the length of its diagonals 12 cm. , 16 cm. And the measure of the included angle between them is 30°
38	The area of the regular hexagon in which the length of its side is 4 cm. equals ....
39	Find the area of the regular hexagon whose side length is 8 cm.
40	Find the area of the regular pentagon whose side length is 18 cm. to the nearest cm^2.
41	Find the area of a regular octagon of side length equals 8 cm.

Sec[1] - Second Term - Final Revision - Solutions - Algebra

Sn.	Answer
1	The value of the determinant $= 2(-3-0) - 3(0-2) = 0$
2	(1) $\begin{vmatrix} 1 & 7 & 5 \\ 3 & 0 & 1 \\ 4 & 0 & 6 \end{vmatrix} = -7(18-4) = -98$ (2) $\begin{vmatrix} -2 & 3 & 7 \\ 0 & 4 & 5 \\ 0 & 0 & -3 \end{vmatrix} = -2 \times 4 \times -3 = 24$
3	$\because \begin{vmatrix} 1 & 0 & 0 \\ 1 & x & x \\ 5 & 2 & x \end{vmatrix} = 3$ $\therefore x^2 - 2x = 3$ $\therefore x^2 - 2x - 3 = 0$ $\therefore (x-3)(x+1) = 0$ $\therefore x = 3$ or $x = -1$
4	$\because 2x - 5 = 25$ $\therefore 2x = 30$ $\therefore x = 15$ $, \because 2y + 12 = y + 18$ $\therefore y = 6$
5	$\because X = 2A - 3B$ $= \begin{pmatrix} 8 & 16 & -12 \\ 4 & -8 & 16 \\ 12 & 24 & 0 \end{pmatrix} - \begin{pmatrix} 6 & -18 & 6 \\ 12 & -30 & 0 \\ -3 & 24 & -12 \end{pmatrix}$ $= \begin{pmatrix} 2 & 34 & -18 \\ -8 & 22 & 16 \\ 15 & 0 & 12 \end{pmatrix}$
6	$2A - 3B + 4C$ $= \begin{pmatrix} 4 & -2 \\ -6 & 10 \end{pmatrix} + \begin{pmatrix} 3 & -12 \\ -18 & 6 \end{pmatrix} + \begin{pmatrix} 4 & -12 \\ 0 & 12 \end{pmatrix}$ $= \begin{pmatrix} 11 & -26 \\ -24 & 28 \end{pmatrix}$
7	(1) $A + B = \begin{pmatrix} -4 & -1 \\ -3 & -7 \end{pmatrix} + \begin{pmatrix} 2 & -7 \\ 8 & -1 \end{pmatrix}$ $= \begin{pmatrix} -2 & -8 \\ 5 & -8 \end{pmatrix}$ (2) B + C is impossible
8	$A^t + B = \begin{pmatrix} 2 & 1 & 5 \\ 3 & 0 & 1 \end{pmatrix} + \begin{pmatrix} -1 & 1 & 1 \\ 3 & 2 & 1 \end{pmatrix}$ $= \begin{pmatrix} 1 & 2 & 6 \\ 6 & 2 & 2 \end{pmatrix}$
9	$A + B = \begin{pmatrix} -3 & 1 \\ 2 & 5 \end{pmatrix} + \begin{pmatrix} 2 & 4 \\ -1 & 3 \end{pmatrix} = \begin{pmatrix} -1 & 5 \\ 1 & 8 \end{pmatrix}$ $\therefore (A+B)^t = \begin{pmatrix} -1 & 1 \\ 5 & 8 \end{pmatrix}$ $, A^t + B^t = \begin{pmatrix} -3 & 2 \\ 1 & 5 \end{pmatrix} + \begin{pmatrix} 2 & -1 \\ 4 & 3 \end{pmatrix} = \begin{pmatrix} -1 & 1 \\ 5 & 8 \end{pmatrix}$ $\therefore (A+B)^t = A^t + B^t$
10	$X = A + B^t = \begin{pmatrix} 3 & 1 \\ 4 & 1 \end{pmatrix} + \begin{pmatrix} 4 & 6 \\ 3 & 6 \end{pmatrix} = \begin{pmatrix} 7 & 7 \\ 7 & 7 \end{pmatrix}$
11	$\because A^t = \begin{pmatrix} 2 & -1 \\ 0 & 5 \end{pmatrix} - \begin{pmatrix} 1 & -2 \\ 3 & -4 \end{pmatrix}$ $\therefore A^t = \begin{pmatrix} 1 & 1 \\ -3 & 9 \end{pmatrix}$ $\therefore A = \begin{pmatrix} 1 & -3 \\ 1 & 9 \end{pmatrix}$
12	$AB = \begin{pmatrix} 0 & 2 \\ -2 & -3 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} 5 & 0 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} -2 & 2 \\ -7 & -3 \\ 1 & 4 \end{pmatrix}$, BA is impossible.

13

$$AB=\begin{pmatrix}1\\4\end{pmatrix}\begin{pmatrix}3&-2\end{pmatrix}=\begin{pmatrix}3&-2\\12&-8\end{pmatrix}$$

$$\therefore X^t=\begin{pmatrix}3&-2\\12&-8\end{pmatrix}+\begin{pmatrix}3&0\\-6&5\end{pmatrix}=\begin{pmatrix}6&-2\\6&-3\end{pmatrix}$$

$$\therefore X=\begin{pmatrix}6&6\\-2&-3\end{pmatrix}$$

14

$$A^t=\begin{pmatrix}2&0\\1&-1\end{pmatrix}$$

$$\therefore A^tB=\begin{pmatrix}2&0\\1&-1\end{pmatrix}\begin{pmatrix}1&3\\-1&2\end{pmatrix}=\begin{pmatrix}2&6\\2&1\end{pmatrix}$$

15

$$A^2=\begin{pmatrix}3&-2\\-3&2\end{pmatrix}\begin{pmatrix}3&-2\\-3&2\end{pmatrix}=\begin{pmatrix}15&-10\\-15&10\end{pmatrix}$$

$$\therefore A^2-5A=\begin{pmatrix}15&-10\\-15&10\end{pmatrix}-\begin{pmatrix}15&-10\\-15&10\end{pmatrix}$$

$$=\begin{pmatrix}0&0\\0&0\end{pmatrix}=O$$

16

$$A^2=\begin{pmatrix}4&2\\6&-2\end{pmatrix}\begin{pmatrix}4&2\\6&-2\end{pmatrix}=\begin{pmatrix}28&4\\12&16\end{pmatrix}$$

$$\therefore A^2-2A-20I$$

$$=\begin{pmatrix}28&4\\12&16\end{pmatrix}-\begin{pmatrix}8&4\\12&-4\end{pmatrix}-\begin{pmatrix}20&0\\0&20\end{pmatrix}$$

$$=\begin{pmatrix}0&0\\0&0\end{pmatrix}=O$$

17

$$\because \begin{pmatrix}2&3\\4&5\end{pmatrix}\begin{pmatrix}x&7\\3&y\end{pmatrix}=\begin{pmatrix}7&8\\11&18\end{pmatrix}$$

$$\therefore \begin{pmatrix}2x+9&14+3y\\4x+15&28+5y\end{pmatrix}=\begin{pmatrix}7&8\\11&18\end{pmatrix}$$

$\because 2x+9=7 \quad \therefore 2x=-2 \quad \therefore x=-1$

$, 28+5y=18 \quad \therefore 5y=-10 \quad \therefore y=-2$

18

$$\because \begin{vmatrix}x&-xy\\0&y\end{vmatrix}=xy\neq 0 \quad \therefore B^{-1} \text{ is defined}$$

$$, B^{-1}=\frac{1}{xy}\begin{pmatrix}y&xy\\0&x\end{pmatrix}=\begin{pmatrix}\frac{1}{x}&1\\0&\frac{1}{y}\end{pmatrix}$$

19

$$\text{Area of } \Delta ABC=\frac{1}{2}\begin{vmatrix}-1&-3&1\\2&4&1\\-3&5&1\end{vmatrix}$$

$$=\frac{1}{2}\left[-1(4-5)+3(2+3)+1(10+12)\right]$$

= 19 square units.

20

$$\Delta=\begin{vmatrix}1&-1\\3&2\end{vmatrix}=5$$

$$, \Delta_x=\begin{vmatrix}7&-1\\1&2\end{vmatrix}=15 , \Delta_y=\begin{vmatrix}1&7\\3&1\end{vmatrix}=-20$$

$$\therefore x=\frac{\Delta_x}{\Delta}=\frac{15}{5}=3 , y=\frac{\Delta_y}{\Delta}=\frac{-20}{5}=-4$$

21

$$\Delta=\begin{vmatrix}2&3\\1&-2\end{vmatrix}=-7 , \Delta_x=\begin{vmatrix}8&3\\-3&-2\end{vmatrix}=-7$$

$$, \Delta_y=\begin{vmatrix}2&8\\1&-3\end{vmatrix}=-14$$

$$\therefore x=\frac{\Delta_x}{\Delta}=\frac{-7}{-7}=1 , y=\frac{\Delta_y}{\Delta}=\frac{-14}{-7}=2$$

22

$$\Delta=\begin{vmatrix}1&-3\\2&1\end{vmatrix}=7 , \Delta_x=\begin{vmatrix}-4&-3\\2&1\end{vmatrix}=2$$

$$, \Delta_y=\begin{vmatrix}1&-4\\2&2\end{vmatrix}=10$$

$$\therefore x=\frac{\Delta_x}{\Delta}=\frac{2}{7} , y=\frac{\Delta_y}{\Delta}=\frac{10}{7}$$

$$\therefore \textit{The S.S.}=\left\{\left(\frac{2}{7} , \frac{10}{7}\right)\right\}$$

23

$$\begin{pmatrix}1 & 1\\3 & -1\end{pmatrix}\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}5\\3\end{pmatrix},$$

$$\because \begin{vmatrix}1 & 1\\3 & -1\end{vmatrix}=-4\neq 0$$

$$\therefore \begin{pmatrix}x\\y\end{pmatrix}=\frac{-1}{4}\begin{pmatrix}-1 & -1\\-3 & 1\end{pmatrix}\begin{pmatrix}5\\3\end{pmatrix}=\frac{-1}{4}\begin{pmatrix}-8\\-12\end{pmatrix}=\begin{pmatrix}2\\3\end{pmatrix}$$

$$\therefore x=2\ ,\ y=3$$

24

$$\Delta=\begin{vmatrix}2 & -3\\1 & 2\end{vmatrix}=7\ ,\ \Delta_x=\begin{vmatrix}3 & -3\\5 & 2\end{vmatrix}=21$$

$$,\Delta_y=\begin{vmatrix}2 & 3\\1 & 5\end{vmatrix}=7$$

$$\therefore x=\frac{\Delta_x}{\Delta}=\frac{21}{7}=3\ ,\ y=\frac{\Delta_y}{\Delta}=\frac{7}{7}=1$$

25

The two equations are : $x+3y=5\ ,\ 2x+5y=8$

$$\Delta=\begin{vmatrix}1 & 3\\2 & 5\end{vmatrix}=-1\ ,\ \Delta_x=\begin{vmatrix}5 & 3\\8 & 5\end{vmatrix}=1$$

$$,\Delta_y=\begin{vmatrix}1 & 5\\2 & 8\end{vmatrix}=-2$$

$$\therefore x=\frac{\Delta_x}{\Delta}=\frac{1}{-1}=-1\ ,\ y=\frac{\Delta_y}{\Delta}=\frac{-2}{-1}=2$$

26

$$\Delta=\begin{vmatrix}3 & 2\\2 & -3\end{vmatrix}=-9-4=-13$$

$$\Delta_x=\begin{vmatrix}12 & 2\\-5 & -3\end{vmatrix}=-36+10=-26$$

$$\Delta_y=\begin{vmatrix}3 & 12\\2 & -5\end{vmatrix}=-15-24=-39$$

$$\therefore x=\frac{\Delta_x}{\Delta}=\frac{-26}{-13}=2\ ,\ y=\frac{\Delta_y}{\Delta}=\frac{-39}{-13}=3$$

27

$$\Delta=\begin{vmatrix}2 & -1\\4 & 3\end{vmatrix}=10\ ,\ \Delta_x=\begin{vmatrix}10 & -1\\10 & 3\end{vmatrix}=40$$

$$,\Delta_y=\begin{vmatrix}2 & 10\\4 & 10\end{vmatrix}=-20$$

$$\therefore x=\frac{\Delta_x}{\Delta}=\frac{40}{10}=4\ ,\ y=\frac{\Delta_y}{\Delta}=\frac{-20}{10}=-2$$

28

$$\because \begin{pmatrix}3 & 2\\2 & 1\end{pmatrix}\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}5\\3\end{pmatrix},$$

$$\because \begin{vmatrix}3 & 2\\2 & 1\end{vmatrix}=-1\neq 0$$

$$\therefore \begin{pmatrix}x\\y\end{pmatrix}=\frac{1}{-1}\begin{pmatrix}1 & -2\\-2 & 3\end{pmatrix}\begin{pmatrix}5\\3\end{pmatrix}$$

$$\therefore \begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}-1 & 2\\2 & -3\end{pmatrix}\begin{pmatrix}5\\3\end{pmatrix}=\begin{pmatrix}1\\1\end{pmatrix}$$

$$\therefore x=1\ ,\ y=1$$

29

$$\Delta=\begin{vmatrix}2 & -3\\3 & 4\end{vmatrix}=17\ ,\ \Delta_x=\begin{vmatrix}5 & -3\\-1 & 4\end{vmatrix}=17$$

$$,\Delta_y=\begin{vmatrix}2 & 5\\3 & -1\end{vmatrix}=-17$$

$$\therefore x=\frac{\Delta_x}{\Delta}=\frac{17}{17}=1\ ,\ y=\frac{\Delta_y}{\Delta}=\frac{-17}{17}=-1$$

30

$$\Delta=\begin{vmatrix}2 & 3\\3 & -1\end{vmatrix}=-11\ ,\ \Delta_x=\begin{vmatrix}12 & 3\\8 & -1\end{vmatrix}=-36$$

$$,\Delta_y=\begin{vmatrix}2 & 12\\3 & 8\end{vmatrix}=-20$$

$$\therefore x=\frac{\Delta_x}{\Delta}=\frac{-36}{-11}=\frac{36}{11}\ ,\ y=\frac{-20}{-11}=\frac{20}{11}$$

$$\therefore \text{The S.S.}=\left\{\left(\frac{36}{11}\ ,\ \frac{20}{10}\right)\right\}$$

31

$$\Delta=\begin{vmatrix}1 & 1 & 1\\2 & -1 & 1\\1 & -1 & 2\end{vmatrix}$$

$$=1(-2+1)-1(4-1)+1(-2+1)=-5$$

$$\Delta_x=\begin{vmatrix}6 & 1 & 1\\3 & -1 & 1\\5 & -1 & 2\end{vmatrix}$$

$$=6(-2+1)-1(6-5)+1(-3+5)=-5$$

$$\Delta_y=\begin{vmatrix}1 & 6 & 1\\2 & 3 & 1\\1 & 5 & 2\end{vmatrix}$$

$= 1\,(6-5) - 6\,(4-1) + 1\,(10-3) = -10$

$$, \Delta_z = \begin{vmatrix} 1 & 1 & 6 \\ 2 & -1 & 3 \\ 1 & -1 & 5 \end{vmatrix}$$

$= 1\,(-5+3) - 1\,(10-3) + 6\,(-2+1) = -15$

$\therefore x = \dfrac{\Delta_x}{\Delta} = \dfrac{-5}{-5} = 1 \;, y = \dfrac{\Delta_y}{\Delta} = \dfrac{-10}{-5} = 2$

$, z = \dfrac{\Delta_z}{\Delta} = \dfrac{-15}{-5} = 3$

32 Repeated

33 Repeated

34

$$\text{Area of } \Delta ABC = \frac{1}{2}\begin{vmatrix} 0 & 0 & 1 \\ 2 & 4 & 1 \\ -1 & 3 & 1 \end{vmatrix}$$

$= \frac{1}{2}[6+4] = 5$ square unit

35

$$\because \begin{vmatrix} 3 & 5 & 1 \\ 4 & -1 & 1 \\ 5 & -7 & 1 \end{vmatrix}$$

$= 1\,(-28+5) - 1\,(-21-25) + 1\,(-3-20) = 0$

$\therefore$ The points $(3 , 5)$, $(4 , -1)$ and $(5 , -7)$ are collinear.

36

$$\text{Area of } \Delta ABC = \frac{1}{2}\begin{vmatrix} 0 & 2 & 1 \\ 3 & 2 & 1 \\ 6 & 5 & 1 \end{vmatrix}$$

$= \frac{1}{2}\left[-2\,(3-6) + 1\,(15-12)\right]$

$= 4.5$ square unit

37

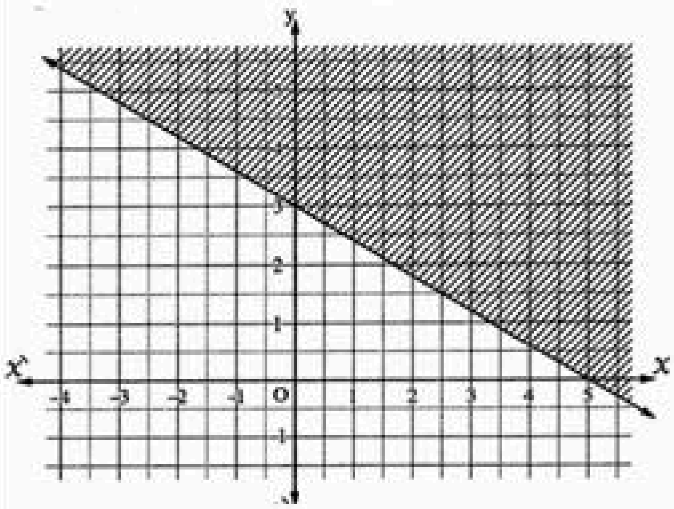
$$\text{Area of } \Delta ABC = \frac{1}{2}\begin{vmatrix} -1 & -3 & 1 \\ 2 & 4 & 1 \\ -3 & 5 & 1 \end{vmatrix}$$

$= \frac{1}{2}\left[-1\,(4-5) + 3\,(2+3) + 1\,(10+12)\right]$

$= 19$ square units.

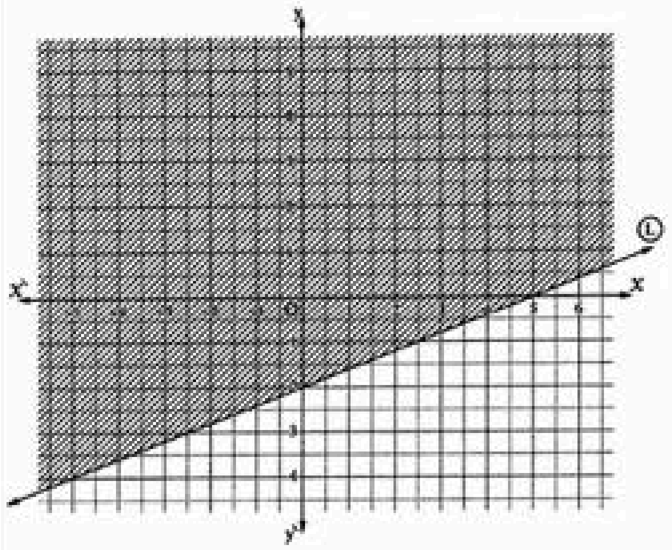
38

Draw the boundary line $L : 3x + 5y = 15$ (solid) passing through $(0 , 3)$, $(5 , 0)$



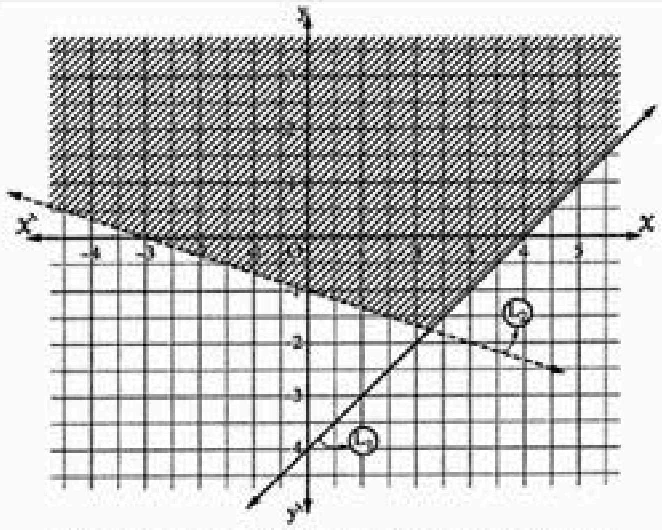
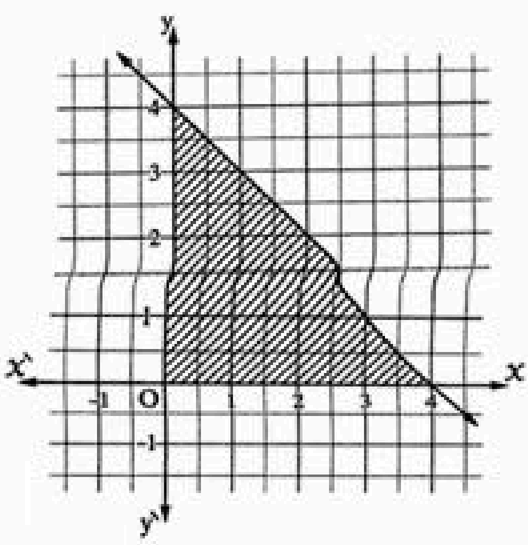
39

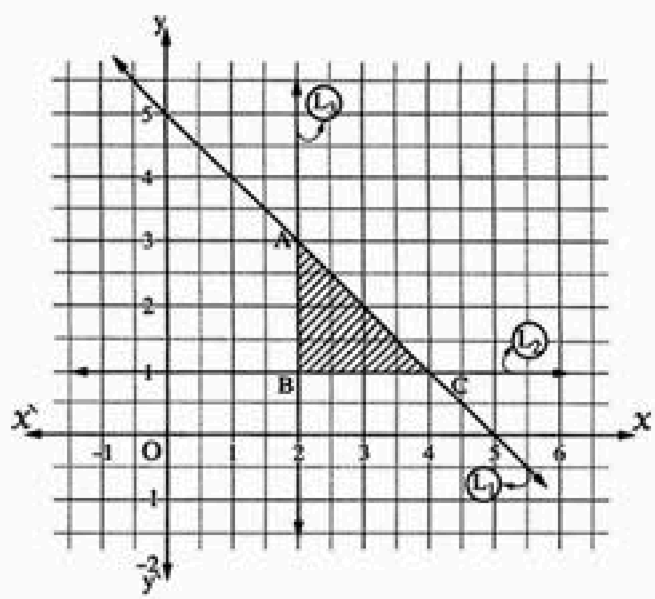
Draw the boundary line $L : 2x - 5y = 10$ (solid) passing through $(5 , 0)$, $(0 , -2)$



40

- Draw the boundary line $L_1 : x - y = 4$ (solid) passing through $(0 , -4)$, $(4 , 0)$
- Draw the boundary line $L_2 : x + 3y = -3$ (dashed) passing through $(0 , -1)$, $(-3 , 0)$

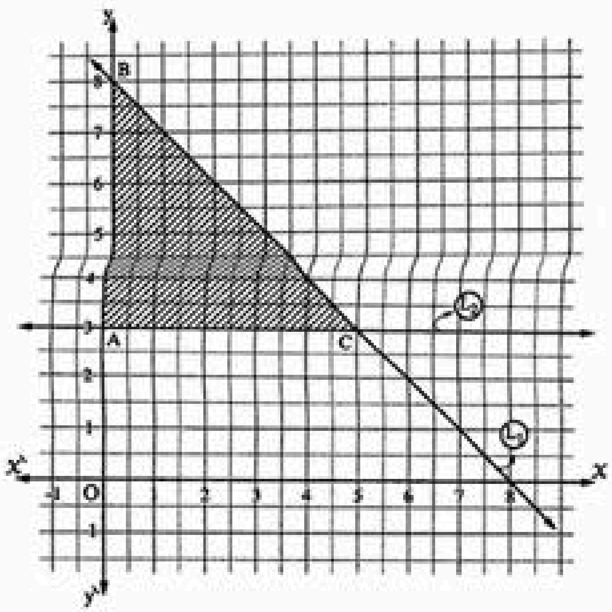
	 ∴ The S.S. of the inequalities is the shaded region in the graph
41	**Repeated**
42	**Repeated**
43	**Repeated**
44	• $X \geq 0$, $y \geq 0$ is represented by $\overrightarrow{OX} \cup \overrightarrow{OY} \cup$ first quadrant. • Draw the boundary line $L : X + y = 4$ (solid) passing through $(0 , 4)$, $(4 , 0)$  The S.S. of the inequalities is the shaded region in the graph.
45	**Repeated**
46	**Repeated**

47	**Repeated**
48	**Repeated**
49	**Repeated**
50	**Repeated**
51	**Repeated**
52	**Repeated**
53	• Draw the boundary line $L_1 : X + y = 5$ (solid) passing through $(0 , 5)$, $(5 , 0)$ • Draw the boundary line $L_2 : y = 1$ (solid) parallels X-axis and intersect y-axis at $(0 , 1)$ • Draw the boundary line $L_3 : X = 2$ (solid) parallels y-axis and intersect X-axis at $(2 , 0)$ ∴ The S.S. is the shaded region ABC where $A (2 , 3)$, $B (2 , 1)$, $C (4 , 1)$, ∵ the objective function $P = 2 X + 3 y$ ∴ $[P]_A = 2 \times 2 + 3 \times 3 = 13$, $[P]_B = 2 \times 2 + 3 \times 1 = 7$, $[P]_C = 2 \times 4 + 3 \times 1 = 11$ ∴ the objective function is as small as possible at $B (2 , 1)$ 

54	Exam [6] Ques. [5] [b]

55

- $x \geq 0$, $y \geq 0$ is represented by $\overrightarrow{OX} \cup \overrightarrow{OY} \cup$ first quadrant
- Draw the boundary line $L_1 : x + y = 8$ (solid) passing through $(0 , 8)$, $(8 , 0)$
- Draw the boundary line $L_2 : y = 3$ (solid) parallels the x-axis and intersect y-axis at $(0 , 3)$



$\therefore$ The S.S. of the inqualities is the shaded region ABC where A $(0 , 3)$, B $(0 , 8)$, C $(5 , 3)$

, $\because$ the objective function is $P = 3x + 2y$

$\therefore [P]_A = 2 \times 3 = 6$, $[P]_B = 2 \times 8 = 16$

, $[P]_C = 3 \times 5 + 2 \times 3 = 21$

$\therefore$ the maximum value is 21 at the point $(5 , 3)$

56	Repeated
57	Repeated
58	Repeated
59	Repeated

60

	1^{st} kind	2^{nd} kind	upper limit of allowed amount
Corn flour	200	100	4000
Sugar	25	50	1250

- Let number of produced units of the 1^{st} kind be x and of the 2^{nd} kind is y
- Translate the previous data in the form of inequalities

(1) $x \geq 0$, $y \geq 0$

(2) $200x + 100y \leq 4000$ *i.e.* $2x + y \leq 40$

(3) $25x + 50y \leq 1250$ *i.e.* $x + 2y \leq 50$

- The objective function

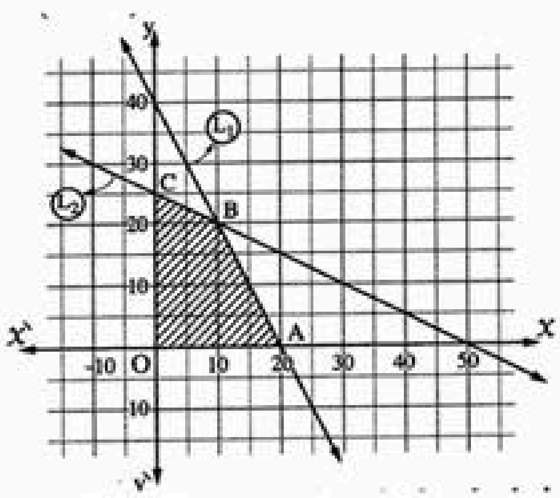
The produced number of units $P = x + y$ as great as possible.

First : Determine the region that represent the S.S. of the inequalities as follows :

(1) The two inequalities $x \geq 0$, $y \geq 0$ are represented by $\overrightarrow{OX} \cup \overrightarrow{OY} \cup 1^{st}$ quadrant

(2) Draw the boundary line $L_1 : 2x + y = 40$ passes through $(0 , 40)$, $(20 , 0)$

(3) Draw the boundary line $L_2 : x + 2y = 50$ passes through $(0 , 25)$, $(50 , 0)$



$\therefore$ The S.S. of the inequalities is the shaded region OABC where : O $(0 , 0)$, A $(20 , 0)$, B $(10 , 20)$, C $(0 , 25)$

Second : The objective function $P = x + y$

$\therefore [P]_A = 20 + 0 = 20$, $[P]_B = 10 + 20 = 30$

, $[P]_C = 0 + 25 = 25$, $[P]_O = 0$

$\therefore$ The greatest number of units is 30 at the production of 10 from the first kind and 20 from the second kind.

61

* Let the number of fish of kind A = x and kind B = y

$\therefore$ (1) $x + y \geq 50$ (2) $x \leq 30$ (3) $y \leq 35$

* The objective function : P is minimum where

$P = 4x + 3y$

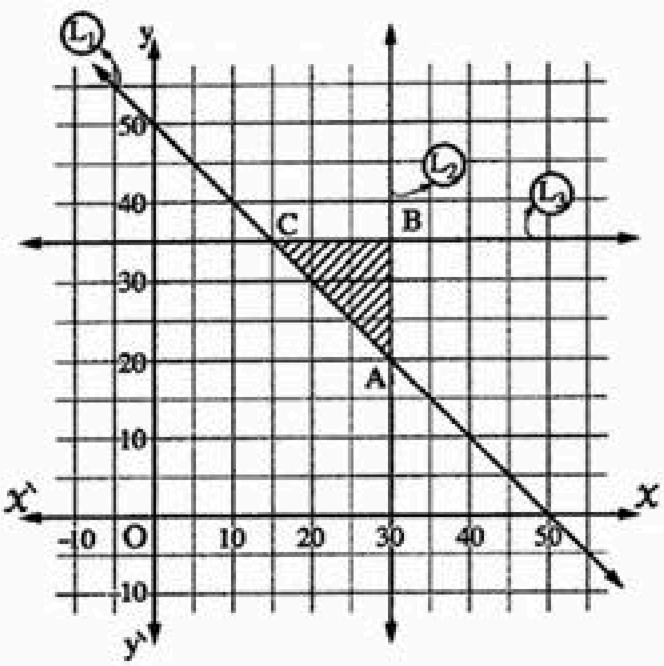
First : Determine the region that represents the S.S. of the inequalities as follows :

(1) Draw the boundary line $L_1 : x + y = 50$

that passes through (0 , 50) , (50 , 0)

(2) Draw the boundary line $L_2 : x = 30$

(3) Draw the boundary line $L_3 : y = 35$



$\therefore$ The S.S. of the inequalities represented by the shaded region in the graph ABC where

A (30 , 20) , B (30 , 35) , C (15 , 35)

Second : $\because$ The objective function : $P = 4x + 3y$

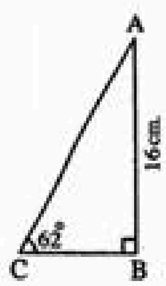
$\therefore [P]_A = 4 \times 30 + 3 \times 20 = 180$

, $[P]_B = 4 \times 30 + 3 \times 35 = 225$

, $[P]_C = 4 \times 15 + 3 \times 35 = 165$

$\therefore$ The minimum value is 165 when buying 15 fish of kind A and 35 fish of kind B

Sec[1] - Second Term - Final Revision - Solutions - Trig

Sn.	Answer
1	$\because 2\sin\theta\cos\theta - \sin\theta = 0$ $\therefore \sin\theta\,(2\cos\theta - 1) = 0$ $\therefore \sin\theta = 0 \qquad \therefore \theta = 0^\circ$ or $\theta = 180^\circ$ or $2\cos\theta - 1 = 0 \quad \therefore \cos\theta = \frac{1}{2}$ (positive) $\therefore \theta$ lies in the first or fourth quadrant $\therefore \theta = 60^\circ$ or 300° $\therefore$ The S.S. $= \{0^\circ , 60^\circ , 180^\circ , 300^\circ\}$
2	$\because 2\sin x + 1 = 0 \quad \therefore \sin x = -\frac{1}{2}$ (negative) $\therefore x$ lies in the third or fourth quadrant $, \because \sin 30^\circ = \frac{1}{2}$ $\therefore x = 180^\circ + 30^\circ = 210^\circ$ or $x = 360^\circ - 30^\circ = 330^\circ$ $\therefore$ The S.S. $= \{210^\circ , 330^\circ\}$
3	$\because 2\sin\theta - \sqrt{3} = 0 \quad \therefore \sin\theta = \frac{\sqrt{3}}{2}$ (positive) $\therefore \theta$ lies in the first or second quadrant $, \because \sin 60^\circ = \frac{\sqrt{3}}{2}$ $\therefore \theta = 60^\circ$ or $\theta = 180^\circ - 60^\circ = 120^\circ$ $\therefore$ The S.S. $= \{60^\circ , 120^\circ\}$
4	$\because 2\cos\theta = \sqrt{3} \quad \therefore \cos\theta = \frac{\sqrt{3}}{2}$ (positive) $\therefore \theta$ lies in the first quadrant $\quad \therefore \theta = 30^\circ$ or θ lies in the fourth quadrant $\therefore \theta = 360^\circ - 30^\circ = 330^\circ$ and it is equivalent to (-30°) $\therefore \theta = \pm 30 + 2n\pi , n \in \mathbb{Z}$ $\therefore$ The general solution is $\theta = \pm\frac{\pi}{6} + 2n\pi$
5	L.H.S. $= \frac{\csc^2\theta}{\sec^2\theta} = \frac{1}{\sin^2\theta} \div \frac{1}{\cos^2\theta} = \frac{1}{\sin^2\theta} \times \cos^2\theta$ $= \cot^2\theta =$ R.H.S.
6	L.H.S. $= \cot C \div (1 + \cot^2 C)$ $= \frac{\cos C}{\sin C} \div \csc^2 C = \frac{\cos C}{\sin C} \times \sin^2 C = \sin C \cos C$
7	L.H.S. $= \tan\theta + \cot\theta = \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$ $= \frac{\sin^2\theta + \cos^2\theta}{\sin\theta\cos\theta} = \frac{1}{\sin\theta\cos\theta}$ $= \sec\theta\csc\theta =$ R.H.S.
8	R.H.S. $= \sin^2\theta\,(1 + \tan^2\theta) = \sin^2\theta\sec^2\theta$ $= \frac{\sin^2\theta}{\cos^2\theta} = \tan^2\theta =$ L.H.S.
9	L.H.S. $= \frac{\cos^2\theta}{1 - \sin\theta} = \frac{1 - \sin^2\theta}{1 - \sin\theta} = \frac{(1 - \sin\theta)(1 + \sin\theta)}{1 - \sin\theta}$ $= 1 + \sin\theta =$ R.H.S.
10	$\frac{\sin\theta + \cos\theta}{\tan\theta} + \frac{\tan\theta}{\sec\theta\csc\theta}$ $= (\sin\theta\cos\theta)\left(\frac{\cos\theta}{\sin\theta}\right) + \frac{\sin\theta}{\cos\theta} \times \cos\theta \times \sin\theta$ $= \cos^2\theta + \sin^2\theta = 1$
11	$\because \tan 28^\circ = \frac{CB}{16}$ $\therefore CB \approx 8.5$ cm. $, \because \cos 28^\circ = \frac{16}{AC}$ $\therefore AC \approx 18.1$ cm. $, m(\angle C) = 90^\circ - 28^\circ = 62^\circ$ 
12	$\because \sin 62^\circ = \frac{16}{AC}$ $\therefore AC \simeq 18.12$ cm. $, \because \tan 62^\circ = \frac{16}{CB}$ $\therefore CB \simeq 8.51$ cm. $, m(\angle A) = 90^\circ - 62^\circ = 28^\circ$ 

13

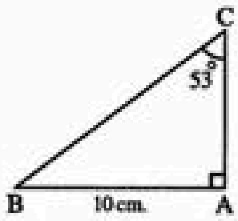
$\because \sin 53° = \frac{10}{BC}$

$\therefore BC \approx 12.5$ cm.

, $\tan 53° = \frac{10}{AC}$

$\therefore AC \approx 7.5$ cm.

$\therefore m(\angle B) = 90° - 53° = 37°$



14

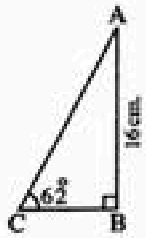
$\because \sin 62° = \frac{16}{AC}$

$\therefore AC \approx 18.12$ cm.

, $\because \tan 62° = \frac{16}{CB}$

$\therefore CB \approx 8.51$ cm.

, $m(\angle A) = 90° - 62° = 28°$



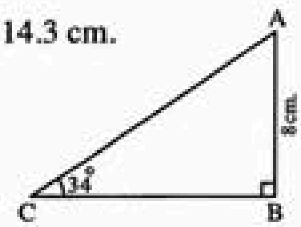
15

$\because \sin 34° = \frac{8}{AC}$ $\therefore AC \approx 14.3$ cm.

, $\because \tan 34° = \frac{8}{CB}$

$\therefore CB \approx 11.9$ cm.

, $m(\angle A) = 90° - 34° = 56°$



16

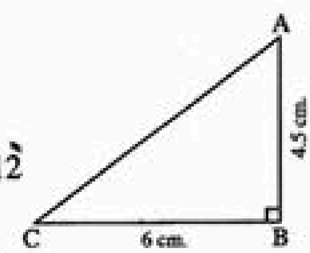
$\tan C = \frac{4.5}{6} = \frac{3}{4}$

$\therefore m(\angle C) \approx 36° \, 52' \, 12''$

, $m(\angle A) = 90° - 36° \, 52' \, 12''$

$= 53° \, 7' \, 48''$

, $AC = \sqrt{4.5^2 + 6^2} = 7.5$ cm.



17

$\because 2r + 6 = 12$ $\therefore r = 3$

$\therefore$ Area of the sector $= \frac{1}{2} \times 3 \times 6 = 9$ cm^2.

18

Area of the circular sector $= \frac{1}{2}(10)^2(1.2)^{rad}$

$= 60$ cm^2.

19

$r = \frac{20}{2} = 10$ cm.

, $\theta° = 2 \times 60° = 120°$ $\therefore \theta^{rad} = \frac{120° \times \pi}{180°} = \frac{2}{3}\pi$

$\therefore$ Area of the circular sector $= \frac{1}{2}(10)^2\left(\frac{2}{3}\pi\right)$

$= \frac{100}{3}\pi$ cm^2.

20

Area of the circular sector

$= \frac{1}{2} \times 5 \times 10 = 25$ cm^2.

21

Area of the circular sector

$= \frac{1}{2}(12)^2\left(\frac{60° \times \pi}{180°}\right) \approx 75.4$ cm^2.

22

$\because \pi r^2 = 100\pi$ $\therefore r^2 = 100$ $\therefore r = 10$ cm.

, $\because \frac{1}{2} r^2 \theta^{rad} = 100$ $\therefore \frac{1}{2} \times (10)^2 \times \theta^{rad} = 100$

$\therefore \theta^{rad} = 2^{rad}$

$\therefore$ Area of the circular segment

$= \frac{1}{2} \times 100\left(2^{rad} - \sin\frac{2 \times 180°}{\pi}\right) \approx 55$ cm^2.

23

Area of the circular segment

$= \frac{1}{2}(12)^2\left(60° \times \frac{\pi}{180°} - \sin 60°\right)$

≈ 13.04 cm^2.

24

Area of the circular segment

$= \frac{1}{2}(8)^2\left[\frac{150° \times \pi}{180°} - \sin 150°\right] \simeq 67.8$ cm^2.

25

Area of the circular segment

$= \frac{1}{2}(10)^2\left[\frac{120° \times \pi}{180°} - \sin 120°\right] \approx 61.4$ cm^2.

26

Area of the major circular segment

$= \frac{1}{2}(12)^2\left[\frac{300° \times \pi}{180°} - \sin 300°\right]$

≈ 439 cm^2.

27

In Δ MBC :

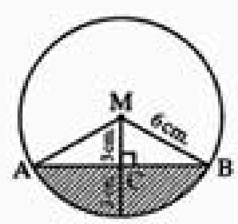
$\because \cos(\angle CMB) = \frac{3}{6} = \frac{1}{2}$

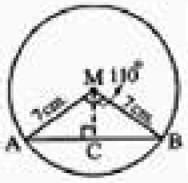
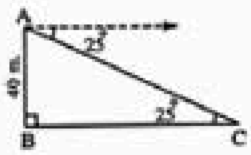
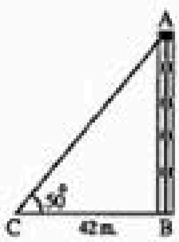
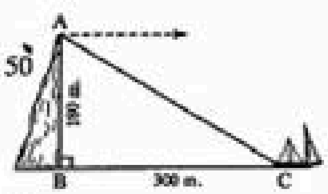
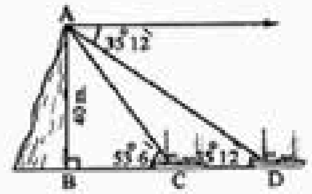
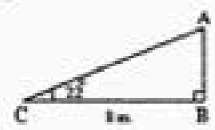
$\therefore m(\angle CMB) = 60°$

$\therefore m(\angle AMB) = 120°$

$\therefore$ Area of the circular segment

$= \frac{1}{2}(6^2)\left(\frac{120° \times \pi}{180°} - \sin 120°\right) \approx 22.1$ cm^2.

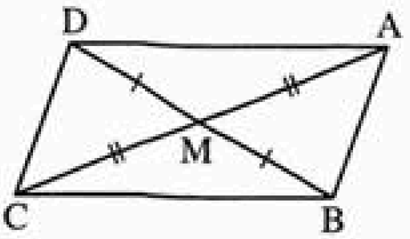


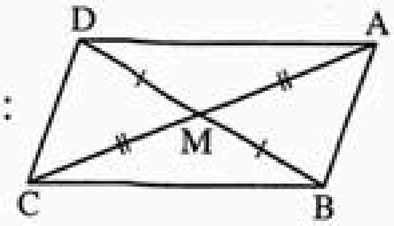
28	Area of the circular sector $= \frac{1}{2} \times 5 \times 10 = 25 \text{ cm}^2$
29	Area of the circular segment $= \frac{1}{2} (8)^2 \left(\frac{150^\circ \times \pi}{180^\circ} - \sin 150^\circ \right) \approx 68 \text{ cm}^2$
30	$\because \sin 55^\circ = \frac{CB}{7}$ $\therefore CB \approx 5.734$ cm. $\therefore$ The length of the chord AB $= 11.468$ cm. 
31	$\because \tan 25^\circ = \frac{40}{BC}$ $\therefore BC \approx 86$ metres $\therefore$ The distance between the body and the base of the tower $\approx$ 86metres 
32	$\because \tan 50^\circ = \frac{AB}{42}$ $\therefore AB \approx 50$ metre $\therefore$ The height of the minaret ≈ 50 metres 
33	$\tan C = \frac{180}{300}$ $\therefore m(\angle C) \approx 30^\circ 57' 50''$ $\approx 0.54^{rad}$ $\therefore$ measure of the depression angle of the boat $\approx 0.54^{rad}$ 
34	In Δ ABC : $\tan 53^\circ 6' = \frac{40}{BC}$ $\therefore BC = \frac{40}{\tan 53^\circ 6'}$ In Δ ABD : $\tan 35^\circ 12' = \frac{40}{BD}$ $\quad \therefore BD = \frac{40}{\tan 35^\circ 12'}$ $\therefore CD = BD - BC = \frac{40}{\tan 35^\circ 12'} - \frac{40}{\tan 53^\circ 6'}$ ≈ 26.67 metres $\therefore$ Distance between the two ships $\approx$ 26.67 metres 
35	$\tan C = \frac{7.2}{4.8}$ $\therefore m(\angle C) \approx 56^\circ 18' 36''$ $\therefore$ elevation angle of the sun $= \frac{56^\circ 18' 36'' \times \pi}{180^\circ} \approx 0.98^{rad}$ 
36	$\because \tan 22^\circ = \frac{AB}{8}$ $\therefore AB = 8 \tan 22^\circ$ ≈ 3.23 metre 
37	Area of the quadrilateral $= \frac{1}{2} \times 12 \times 16 \times \sin 30^\circ = 48 \text{ cm}^2$
38	$24\sqrt{3} \text{ cm}^2$
39	Area of the regular hexagon $= \frac{1}{4} n x^2 \cot \frac{\pi}{n}$ $= \frac{1}{4} \times 6 \times 8^2 \cot 30^\circ$ $= 96\sqrt{3} \text{ cm}^2$
40	Area of the regular pentagon $= \frac{1}{4} \times 5 \times (18)^2 \cot \frac{180^\circ}{5} \approx 557 \text{ cm}^2$
41	Area of the regular octagon $= \frac{1}{4} (8) (8)^2 \cot \frac{\pi}{8}$ $\approx 309 \text{ cm}^2$

[A] : Choose The Correct Answer : -

1	If $\overrightarrow{A} = 2\overrightarrow{i} + 3\overrightarrow{j}$, $\overrightarrow{B} = (4 , k)$ and $\overrightarrow{A} // \overrightarrow{B}$, then k = …………… (a) 6 (b) – 6 (c) 3 (d) 12
2	The length of perpendicular from (0 , 6) to the line $x = 2$ is …………… unit of length. (a) 1 (b) 2 (c) 6 (d) 4
3	If $\overrightarrow{A} = 2\overrightarrow{i} + 3\overrightarrow{j}$, $\overrightarrow{B} = 5\overrightarrow{i} + 7\overrightarrow{j}$, then $\lVert \overrightarrow{AB} \rVert$ = …………… (a) 1 (b) 25 (c) 7 (d) 5
4	The measure of the angle between the two straight lines : $3x - 7 = 0$, $y = 5$ is ……………° (a) 0 (b) 180 (c) 90 (d) 45
5	If : A = (3 , 4) , B = (– 1 , 3) , then $\lVert \overrightarrow{AB} \rVert$ = …………… (a) 5 (b) 17 (c) $\sqrt{5}$ (d) $\sqrt{17}$
6	The length of the perpendicular drawn from the point (1 , – 1) to the straight line whose equation is : $x - y = 0$, is …………… length units. (a) 1 (b) $\sqrt{2}$ (c) 2 (d) $2\sqrt{2}$
7	Which of the following straight lines makes an angle of measure $\frac{3\pi}{4}$ with the positive direction of x-axis …………… (a) $x + y = 6$ (b) $y - x = 6$ (c) $y + \sqrt{2}\,x = 6$ (d) $y - \sqrt{2}\,x = 6$
8	The measure of the acute angle included between the two straight lines : $y = -x$, $x = 0$ …………… (a) 30° (b) 60° (c) 45° (d) 90°
9	If : C (2 , 0) is a midpoint of $\overline{AB}$, where A (3 , 7) , then B = …………… (a) (– 1 , 7) (b) (3 , 0) (c) (1 , – 7) (d) (2.5 , 3.5)

10	The direction vector of the straight line : $3x - 7y + 5 = 0$ is …………… (a) $(3 , 7)$ (b) $(-3 , 5)$ (c) $(7 , 3)$ (d) $(5 , 7)$
11	If : $\overrightarrow{AB} = \overrightarrow{CD}$, $\overrightarrow{AB} = (6 , 4)$, $\overrightarrow{C} = (-1 , 3)$, then $\overrightarrow{D} =$ …………… (a) $(5 , 7)$ (b) $(-5 , -7)$ (c) $(-5 , 7)$ (d) $(7 , 1)$
12	If : $A(3 , 5)$, $B(-1 , k)$, $\|\overline{AB}\| = 4$, then $k =$ …………… (a) 0 (b) 5 (c) 10 (d) ± 5
13	The length of the perpendicular drawn from the point $(-3 , 5)$ to y-axis equals …………… (a) 2 (b) 3 (c) 5 (d) 8
14	The equation of the straight line which passes through the point $(2 , -3)$ and parallel to x-axis is …………… (a) $x + 3 = 0$ (b) $y + 3 = 0$ (c) $x - 2 = 0$ (d) $y - 3 = 0$
15	The vector : $6\hat{i} - 6\hat{j}$ is expressed in the polar form by the vector : …………… (a) $\overrightarrow{m} = \left(6 , \frac{3\pi}{4}\right)$ (b) $\overrightarrow{m} = \left(6\sqrt{2} , \frac{3\pi}{4}\right)$ (c) $\overrightarrow{m} = \left(6\sqrt{2} , \frac{5\pi}{4}\right)$ (d) $\overrightarrow{m} = \left(6\sqrt{2} , \frac{7\pi}{4}\right)$
16	If : $\overrightarrow{A} = (-1 , 5)$, $\overrightarrow{B}(2 , 1)$, then $\|\overrightarrow{AB}\| =$ …………… length units. (a) 9 (b) 16 (c) 5 (d) 25
17	If : $\overrightarrow{C} = \left(8 , \frac{2\pi}{3}\right)$ is a position vector of the point C with respect to the origin point O , then the coordinates of C is …………… (a) $\left(4 , 4\sqrt{3}\right)$ (b) $\left(-4 , 4\sqrt{3}\right)$ (c) $\left(4\sqrt{3} , -4\right)$ (d) $\left(-4 , -4\sqrt{3}\right)$
18	The length of the perpendicular from the point $(1 , 1)$ to the straight line $x + y = 0$ equals …………… length unit. (a) 1 (b) $\sqrt{2}$ (c) 2 (d) $2\sqrt{2}$
19	If : $\overrightarrow{AB} = \overrightarrow{CD}$, where $\overrightarrow{AB} = (6 , 4)$, $\overrightarrow{C} = (-1 , 3)$, then $\overrightarrow{D} =$ …………… (a) $(5 , 7)$ (b) $(-5 , 7)$ (c) $(-5 , -7)$ (d) $(7 , 7)$

20	If the straight line : $3x + 4y - 24 = 0$ intersect with the two coordinates axes x and y in the two points A , B respectively where O is the origin point , then the area of Δ OAB = ... square unit. (a) 48 (b) 24 (c) 12 (d) 6	
21	If : A = (1 , 3) , B = (2 , 5) , C = (– 3 , – 7) , $\overrightarrow{AB} = \overrightarrow{CD}$, then D is .... (a) (2 , 5) (b) (2 , – 5) (c) (– 2 , – 5) (d) (– 2 , 5)	
22	If : $\overrightarrow{A} = (2 , -3)$ is a direction vector to a straight line , then .... is a direction vector to the same straight line. (a) (– 2 , 3) (b) (– 2 , – 3) (c) (2 , 3) (d) (– 6 , – 9)	
23	The Cartesian equation of the straight line which passes through the point (3 , – 4) and the direction vector to it is (2 , –1) is .... (a) $x + 2y + 5 = 0$ (b) $2x + y - 5 = 0$ (c) $x - 2y - 5 = 0$ (d) $x - 2y + 5 = 0$	
24	All statements express $\overrightarrow{MA} + \overrightarrow{MB} + \overrightarrow{MC} + \overrightarrow{MD}$ except : .... (a) $\overrightarrow{AB} + \overrightarrow{DC}$ (b) $\overrightarrow{AB} + \overrightarrow{BM} + \overrightarrow{MA}$ (c) $\overrightarrow{O}$ (d) $\overrightarrow{AB} + \overrightarrow{CD}$	
25	If : A = (3 , 8) , B = (– 3 , 0) , then : $\|\overrightarrow{AB}\|$ .... (a) 8 (b) 10 (c) ± 8 (d) ± 10	
26	The length of the perpendicular drawn from the point (0 , – 5) to the straight line : $x + 7 = 0$ equals .... (a) 2 (b) 5 (c) 7 (d) 12	
27	If $\overrightarrow{u} = (2 , 3)$ is a direction vector to a line, then the perpendicular to it is .... (a) (3 , – 2) (b) (3 , 2) (c) (– 2 , 3) (d) (5 , 3)	

28	**In the opposite figure :** All the following statments expresses $\overrightarrow{AC}$ except the statement :  (a) $2\,\overrightarrow{AM}$ (b) $\overrightarrow{AD} + \overrightarrow{DC}$ (c) $\overrightarrow{AB} + \overrightarrow{BD}$ (d) $\overrightarrow{BC} + \overrightarrow{DC}$
29	In $\Delta\,ABC : \overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA} =$ .... (a) $\overrightarrow{AB}$ (b) $\overrightarrow{BC}$ (c) $\overrightarrow{CA}$ (d) $\vec{0}$
30	The straight line : $x + 3\,y = 0$ .... (a) parallel to x-axis. (b) parallel to y-axis. (c) passes through the origin point. (d) parallel to straight line $3\,x + y = 0$
31	If : $\vec{u} = (3\ ,2)$ is the direction vector of a straight line , then the perpendicular direction vector of the straight line is .... (a) $(-2\ ,3)$ (b) $(6\ ,4)$ (c) $(-6\ ,4)$ (d) $\left(\frac{1}{3}\ ,\frac{1}{2}\right)$
32	If : $\vec{A} = (2\ ,5)$ and $\vec{B} = (K\ ,-4)$ and $\vec{A} \perp \vec{B}$, then K = ... (a) 2 (b) 5 (c) -4 (d) 10
33	If $\overrightarrow{OC} = \left(8\ ,\frac{2\pi}{3}\right)$ is the position vector of the point C relative to the origin point O , then the coordinates of the point C are .... (a) $\left(4\ ,4\sqrt{3}\right)$ (b) $\left(-4\ ,4\sqrt{3}\right)$ (c) $\left(4\sqrt{3}\ ,-4\right)$ (d) $\left(-4\ ,-4\sqrt{3}\right)$
34	If : $\vec{u} = (2\ ,-3)$ is the direction vector of a straight line , then all of the following vectors are direction vectors to the same straight line except the vector .... (a) $(-2\ ,3)$ (b) $(-2\ ,-3)$ (c) $(4\ ,-6)$ (d) $(-4\ ,6)$

35

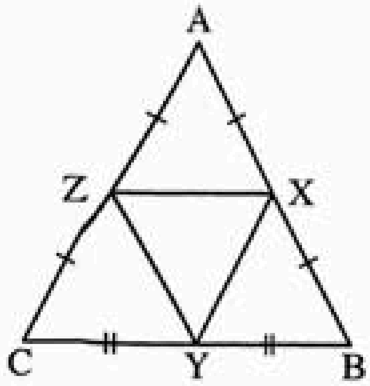
In the opposite figure :

all the following statement :

Express $\| \overrightarrow{XZ} \|$ except = ...

(a) $\| \overrightarrow{XY} + \overrightarrow{YZ} \|$ (b) $\| \overrightarrow{ZY} + \overrightarrow{YX} \|$

(c) $\frac{1}{2} \| \overrightarrow{BC} \|$ (d) $\| \overrightarrow{XB} + \overrightarrow{BY} \|$



36

Which of the following straight lines passes through the origin point ....

(a) $2x + 3 = 0$ (b) $x + 3y = 0$ (c) $2x + 3y = 12$ (d) $y - 5 = 0$

37

The polar form of the position vector of the point $A\left(6, 6\sqrt{3}\right)$ with respect to the origin point is ....

(a) $(12, 60°)$ (b) $(12, 30°)$ (c) $(10, 60°)$ (d) $(10, 30°)$

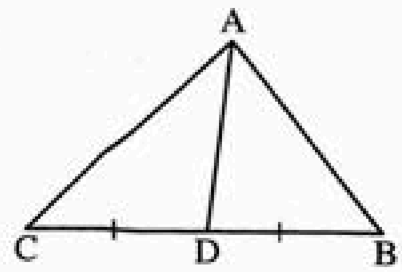
38

In the opposite figure :

$2\overrightarrow{AD} =$ ....

(a) $2\overrightarrow{AB} + 2\overrightarrow{CD}$ (b) $\overrightarrow{AB} + \overrightarrow{BD}$

(c) $\overrightarrow{AB} + \overrightarrow{AC}$ (d) $\overrightarrow{BA} + \overrightarrow{CA}$



39

If $C(2, 4)$ is the midpoint of $\overrightarrow{AB}$ where $A(x, 4)$, $B(1, y)$ ....

(a) $x = 3, y = 4$ (b) $x = 4, y = 3$

(c) $x = 2, y = 6$ (d) $x = 0, y = 0$

40

If $\vec{u} = \left(\frac{1}{2}, 1\right)$ is a direction vector to the line, then all the following vectors are perpendicular to the line except the vector : ....

(a) $\left(1, -\frac{1}{2}\right)$ (b) $(2, -1)$ (c) $\left(-1, -\frac{1}{2}\right)$ (d) $(4, -2)$

41

If : $\overrightarrow{A} = 3\vec{i} - 4\vec{j}$, then $\| 2\overrightarrow{A} \| =$ ....

(a) 5 (b) 3 (c) -4 (d) 10

42

The length of the perpendicular from the point $(3, -4)$ to the x-axis = ...

(a) 3 (b) -4 (c) 5 (d) 4

43

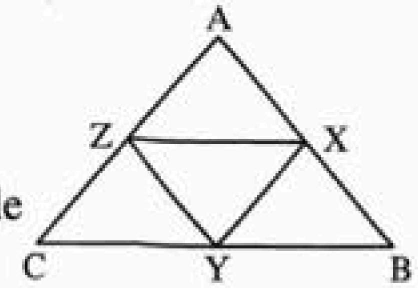
If : $A = (2, 3)$, $B = (5, 4)$, then $\overrightarrow{AB} =$ ....

(a) $(1, 3)$ (b) $(-3, 1)$ (c) $(-1, 3)$ (d) $(3, 1)$

44	If θ is the angle between L_1, and L_2, and $\tan\theta = -1$, then $m(\theta) =$ .... (a) $135°$ (b) $145°$ (c) $90°$ (d) zero
45	The measure of the angle between the two straight lines whose equations are $x = 5$, $y + 3 = 0$ equals : .... (a) $30°$ (b) $45°$ (c) $60°$ (d) $90°$
46	Length of the perpendicular from the point $(1 , 1)$ to the straight line whose equation $x + y = 0$ equals .... (a) 1 (b) 2 (c) $\sqrt{2}$ (d) $2\sqrt{2}$
47	If : $C = (2 , 4)$ is the midpoint of $\overline{AB}$ where $A(3 , y)$, $B(1 , y)$, then $y =$ .... (a) 1 (b) 2 (c) 3 (d) 4
48	The length of the intercepted part from the x-axis by the straight line whose equation : $2x + 3y = 6$ is .... length unit. (a) 2 (b) 3 (c) 4 (d) 6
49	Let $A = (2 , -2)$ and $B = (5 , 2)$, then $\lVert \overrightarrow{AB} \rVert =$ .... length unit. (a) 5 (b) 3 (c) 25 (d) 7
50	Let $\overrightarrow{A} = (-2 , 4)$ and $\overrightarrow{B} = (6 , 3k)$, $\overrightarrow{A} \parallel \overrightarrow{B}$, then $k =$ .... (a) 4 (b) -4 (c) 2 (d) -2
51	The equation of the straight line which passes through the point $(2 , -3)$ and parallel to the x-axis is .... (a) $x + 3 = 0$ (b) $y + 3 = 0$ (c) $x - 2 = 0$ (d) $y - 3 = 0$
52	The straight lines whose vector equation is $\vec{r} = (2 , -1) + k(3 , -5)$, its slope = ... (a) $\frac{1}{2}$ (b) $\frac{-5}{3}$ (c) $\frac{-3}{5}$ (d) $\frac{-1}{2}$

ose the correct answer from the given ones :

53 **In the opposite figure :**



$AB = AC$, X , Y , Z are the midpoints of sides of the triangle ABC Which of the following statements is true ?

(a) $\|\overrightarrow{XY}\| = \|\overrightarrow{ZY}\|$ (b) $\overrightarrow{XY}$ equivalent $\overrightarrow{ZY}$

(c) $\overrightarrow{BY}$ equivalent $\overrightarrow{ZX}$

54 The vector $-12\,\vec{i} - 12\,\vec{j}$ is represented by the vector .... in the polar form.

(a) $\vec{m} = \left(12 , \frac{\pi}{4}\right)$ (b) $\vec{m} = \left(12\sqrt{2} , \frac{\pi}{4}\right)$

(c) $\vec{m} = \left(12\sqrt{2} , \frac{3\pi}{4}\right)$ (d) $\vec{m} = \left(12\sqrt{2} , \frac{5\pi}{4}\right)$

55 If : $\vec{j} = (2 , -3)$ is the direction vector of a straight line , then all of the following are direction vectors for the same straight line except ....

(a) $(-2 , 3)$ (b) $(-2 , -3)$ (c) $(4 , -6)$ (d) $(-4 , 6)$

56 Which of the following straight lines passes through the origin point ?

(a) $2x + 3 = 0$ (b) $x + 3y = 0$ (c) $2x + 3y = 12$ (d) $y - 5 = 0$

[B] : Complete the Following : -

1 $\vec{A} = (5 , 3)$, $\vec{B} = (2 , -1)$, then $\|\vec{A} - \vec{B}\| =$ ....

2 The measure of the angle between the two lines : $x = 3$, $y = -2$ is ....

3 In any ΔABC , $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{AC} =$ ....

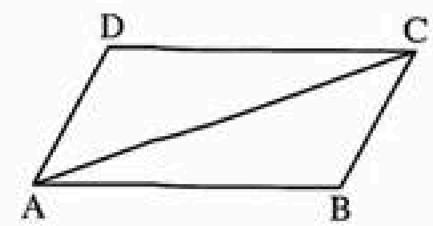
4 The point $(3 , 6)$ is the midpoint of $\overline{AB}$ where $A = (-3 , 7)$, then the coordinates of B are (............... , ...)

5 If $\vec{A} = \vec{0}$ and $\vec{A} = (2k , m - 3)$, then $k =$ .... , $m =$ ....

6 If $\vec{A} = 4\,\vec{i} + n\,\vec{j}$, $\|\vec{A}\| = 5$, then $n =$ ....

7	If $A = (2, 7)$, $B = (-6, 1)$, then the midpoint of $\overline{AB} = (\ldots\ldots, \ldots\ldots)$
8	The straight line whose slope = cos 90° is parallel to .... -axis.
9	If : $\vec{A} = 3\vec{i} + 5\vec{j}$, $\vec{B} = 2\vec{i} - \vec{j}$, then $\vec{A} - 2\vec{B} =$ ....
10	If : $\vec{A} = (-2, 1)$, $\vec{B} = (3, k)$ are perpendicular, then $k =$ ....
11	Measure of the angle between the two lines whose slopes $\frac{5}{6}, -\frac{1}{11}$ equals ....
12	In any triangle XYZ : $\overrightarrow{XY} + \overrightarrow{YZ} + \overrightarrow{ZX} =$ ....
13	If : $\vec{A} = (2, 1)$, $\vec{B} = (4, -3)$, then $2\vec{A} - \vec{B} =$ ....
14	If : $\vec{A} = 3\hat{i} - 4\hat{j}$, then $\lVert\vec{A}\rVert =$ ....
15	$\overrightarrow{AB} + \overrightarrow{BA} =$ ....
16	The vector equation of the straight line which passes through the point $(2, -1)$ and its direction vector $(1, 3)$ is $\vec{r} =$ ....
17	If : $\vec{A} = (-2, 1)$, $\vec{C} = (-3, k)$ are parallel, then $k =$ ....
18	If : $\vec{A} = (4, 2)$, $\vec{B} = (1, -2)$, then $\lVert\vec{A} - \vec{B}\rVert =$ ....
19	The Measure of the angle included between the two straight lines whose slopes $\left(\frac{1}{2}\right)$ and (-2) equals ....
20	The Measure of the Acute angle included between the straight line passing through the two points $(3, 4)$, $(2, 3)$ and the positive direction of x-axis equals ....°
21	In any triangle ABC, $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{AC} =$ ....
22	If : $A = (2, 7)$, $B = (6, -1)$, then $\lVert\overrightarrow{AB}\rVert =$ ....
23	The vector equation of the line passes through the point $(3, 5)$ and parallel to the x-axis is ....

24	The measure of the acute angle between the two straight lines whose two slopes are $\frac{4}{5}$, $\frac{-1}{9}$ is ....
25	If : $A = (-1, 5)$, $B = (2, 1)$, then $\|\overrightarrow{AB}\| =$ ....
26	If : $2\overrightarrow{M} = \overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA}$, then $\overrightarrow{M} =$ ....
27	If : $\overrightarrow{N} = 6\overrightarrow{i} - 8\overrightarrow{j}$, $\overrightarrow{F} = 4\overrightarrow{i} - b\overrightarrow{j}$, $\overrightarrow{F} \perp \overrightarrow{N}$, the value of b is ....
28	If : $A = (-7, 11)$, $B = (-2, 3)$, then the equation of $\overleftrightarrow{AB}$ is ....
29	If : $\overrightarrow{A} = (-2, 3)$, $\overrightarrow{B} = (-4, k)$, $\overrightarrow{A} \parallel \overrightarrow{B}$, then $k =$ ....
30	ABCD is a parallelogram where A (3 , 4) , B (5 , − 1) , C (2 , − 2) , then the coordinates of the point D is ....
31	The measure of the acute angle included between the two straight lines whose slopes are : $\frac{1}{2}$, $-\frac{1}{3}$ equals ....
32	The parametric equations of the straight line passing through the point (4 , − 3) and its direction vector is (2 , 3) are ....
33	If the point A (7 , − 1) and B (2 , 5) , then $\overrightarrow{AB} =$ ....
34	If : C (x, y) is the midpoint of $\overline{AB}$ such that A (x_1, y_1) , B (x_2, y_2) $\therefore x =$ .... , $y =$ ....
35	The vector equation of the straight line which passes through the point (− 4 , 3) and its direction vector is (2 , 5) is ....
36	The length of the perpendicular from the point (x_1, y_1) to the straight line $a x + b y + c = 0$ is ....
37	If : $\overrightarrow{A} = 2\overrightarrow{i} + 3\overrightarrow{j}$, $\overrightarrow{B} = 3\overrightarrow{i} - \overrightarrow{j}$, then $2\overrightarrow{A} - \overrightarrow{B} =$ ....
38	Measure of the angle between the two lines whose slopes $\frac{1}{2}$, − 2 equals ....

39	If : $\overrightarrow{A} = (-2 , 1)$, $\overrightarrow{C} = (-3 , K)$ are parallel , then K = ...
40	Length of the perpendicular from (1 , 1) to the line whose equation $x + y = 0$ equals ....
41	If : $\overrightarrow{A} = 3\overrightarrow{i} + 5\overrightarrow{j}$, $\overrightarrow{B} = 5\overrightarrow{i} - 3\overrightarrow{j}$, then $2\overrightarrow{A} - \overrightarrow{B} =$ ....
42	If : $\overrightarrow{A} = (-2 , 3)$, $\overrightarrow{B} = (4 , k)$, then k = ... when $\overrightarrow{A} // \overrightarrow{B}$
43	The measure of the angle between the two lines whose slopes $\frac{1}{3}$, -3 equals ....
44	The length of the perpendicular drawn from the origin to the straight line $3x - 4y + 10 = 0$ equals ....
45	In any ΔABC : $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{AC} =$ ....
46	If : $\overrightarrow{A} = (2 , 1)$ and $\overrightarrow{B} = (8 , k)$, $\overrightarrow{A} // \overrightarrow{B}$ Then k = ...
47	In the straight line : $\frac{x}{3} + \frac{y}{4} = 1$, then the area of triangle included between this line and two axes = ...
48	If : $r = (3 , 5) + k(4 , 1)$ then the slope of the line = ...
49	**Complete each of the following :**
50	(1) In the opposite figure : ABCD is a parallelogram : $\overrightarrow{AB} + \overrightarrow{AD} =$ .... , $\overrightarrow{AD}$ is equivalent to ....  (2) If : $\overrightarrow{A} = (4 , -3)$, then $\Vert \overrightarrow{A} \Vert =$ .... length units.
51	If : $\overrightarrow{A} = 3\overrightarrow{i} - 2\overrightarrow{j}$, $\overrightarrow{B} = -\overrightarrow{i} + 4\overrightarrow{j}$, then $\overrightarrow{A} + \overrightarrow{B} =$ .... $\overrightarrow{i}$ + ... $\overrightarrow{j}$
52	The points A (3 , 4) , B (2 , 2) , then $\overrightarrow{BA} =$ ....
53	If : $A = \left(6 , 6\sqrt{3}\right)$, then the polar form of the position vector of the point A with respect to the origin point is ....
54	In any triangle ABC : $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA} =$ ....

55	The vector equation of the straight lines which passes through the point $(2, -1)$ and its slope $= \frac{3}{5}$ is ....
56	Let $A = (4, 5)$ and $B = (2, -9)$, then the midpoint of $\overline{AB}$ is ....
57	If : $\overrightarrow{A} = (k, -8)$, $\overrightarrow{B} = (3, 3)$, $\overrightarrow{A} \perp \overrightarrow{B}$, then $k =$ ....
58	If : $\overrightarrow{A} = (2, 5)$, $\overrightarrow{B} = (-1, 2)$, then $\\|\overrightarrow{A} - \overrightarrow{B}\\| =$ ....
59	If : $C = (3, 6)$ is the midpoint of $\overline{AB}$ where $A(1, 7)$, then the coordinates of $B = ($ .... , ... $)$
60	The length of the intercepted part from x-axis by the straight line $2x - 6y = 12$ is ....

[C] : Essay Problems : -

1	If $\overrightarrow{A} = (1, -2)$, $\overrightarrow{B} = (4, 0)$, $\overrightarrow{C} = -3\overrightarrow{j}$, **Evaluate :** $\\|\overrightarrow{A} + 2\overrightarrow{C} - \overrightarrow{B}\\|$
2	If : $\overrightarrow{A} = (2, -6)$, $\overrightarrow{B} = (-2, 5)$, $\overrightarrow{C} = (-6, 14)$, **then find :** (1) $2\overrightarrow{A}$ (2) $-\overrightarrow{B}$ (3) $\frac{1}{2}\overrightarrow{C}$ (4) $\overrightarrow{A} + \overrightarrow{B} - \overrightarrow{C}$
3	Let $\overrightarrow{A} = (2, 1)$ and $\overrightarrow{B} = (3, 6)$, **Find :** $2\overrightarrow{A} - \frac{1}{3}\overrightarrow{B}$
4	If : $\overrightarrow{OA} = (6, 6\sqrt{3})$ **Find** the polar form of the vector $\overrightarrow{OA}$
5	If : $\overrightarrow{OA} = (8\sqrt{3}, 8)$ find the polar form of the vector $\overrightarrow{OA}$
6	If : $\overrightarrow{OA} = (2, 2\sqrt{3})$, **Find the polar form of the vector** $\overrightarrow{OA}$

7	If : $\overrightarrow{L} = 2\overrightarrow{i} - 2\sqrt{3}\,\overrightarrow{j}$, $\overrightarrow{M} = -\overrightarrow{i} + 4\sqrt{3}\,\overrightarrow{j}$, $\overrightarrow{N} = 3\overrightarrow{i} + 2\sqrt{3}\,\overrightarrow{j}$ Find $\overrightarrow{C}$ in the polar form where $\overrightarrow{C} = \overrightarrow{L} + \overrightarrow{M} + \overrightarrow{N}$
8	If : $\overrightarrow{A} = (-3\ ,4)$, $\overrightarrow{B} = (6\ ,-8)$, then find the norm of $\overrightarrow{A}$ and $\overrightarrow{B}$, **then prove that :** $\overrightarrow{A} \parallel \overrightarrow{B}$
9	If : $\overrightarrow{a} = (6\ ,-9)$, $\overrightarrow{b} = (3\ ,2)$, **Prove that :** $\overrightarrow{a} \perp \overrightarrow{b}$
10	Let $\overrightarrow{A} = (6\ ,6)$ and $\overrightarrow{B} = (-3\ ,k)$, $\overrightarrow{A} \perp \overrightarrow{B}$ **Find k**
11	If : $\overrightarrow{A} = (2\ ,5)$, $\overrightarrow{B} = (k\ ,-4)$, **find the value of k when :** (1) $\overrightarrow{A} \parallel \overrightarrow{B}$ (2) $\overrightarrow{A} \perp \overrightarrow{B}$
12	If : $\overrightarrow{A} = (-2\ ,3)$, $\overrightarrow{B} = (-4\ ,m)$, **so find the value of m in each of the following :** (1) $\overrightarrow{A} \parallel \overrightarrow{B}$ (2) $\overrightarrow{A} \perp \overrightarrow{B}$
13	ABCD is a quadrilateral , A (1 , −2) , B (9 , 0) , C (8 , 4) , D (0 , 2) **Prove that : (1)** $\overrightarrow{AB} = \overrightarrow{DC}$ **(2)** $\overrightarrow{AB} \perp \overrightarrow{BC}$
14	If : $\overrightarrow{A} = (-4\ ,6)$, $\overrightarrow{B} = (6\ ,-9)$, $\overrightarrow{C} = (3\ ,2)$ **Prove that :** $\overrightarrow{A} \parallel \overrightarrow{B}$, $\overrightarrow{B} \perp \overrightarrow{C}$
15	If : A = (1 , 0) , B = (11 , 2) , C = (10 , 6) , D = (0 , 4) **Prove that :** (1) $\overrightarrow{AB} = \overrightarrow{DC}$ (2) ABCD is a parallelogram
16	If : $\overrightarrow{A} = 3\overrightarrow{i} + 2\overrightarrow{j}$, $\overrightarrow{B} = 2\overrightarrow{i} + k\overrightarrow{j}$, **Find the value of k if :** (1) $\overrightarrow{A} \parallel \overrightarrow{B}$ (2) $\overrightarrow{A} \perp \overrightarrow{B}$

17	If : $\overrightarrow{A} = (2\ ,4)$ and $\overrightarrow{B} = (k\ ,-4)$, **Find the value of k when :** (1) $\overrightarrow{A} \,//\, \overrightarrow{B}$ (2) $\overrightarrow{A} \perp \overrightarrow{B}$
18	If the straight line passing throug the point A $(-3\ ,5)$ and the vector $(-1\ ,2)$ is perpendicular to it , Find the vector form and cartesian form of the line.
19	**Prove that the two lines :** $\overrightarrow{r} = (0\ ,4) + k\,(1\ ,-2)$, $2x + y + 2 = 0$ are parallel.
20	Find in terms of the two fundamental unit vectors , the vector which expresses a force of magnitude 50 newtons acts on a particle in the direction $30°$ north of east.
21	If : $\overrightarrow{A}\,(2\ ,k)$, $\overrightarrow{B} = 5\,\overrightarrow{i} - 9\,\overrightarrow{j}$ and $\overrightarrow{A} \,//\, \overrightarrow{B}$. Find k
22	Draw $\overrightarrow{M} = \left(2\ ,\frac{\pi}{4}\right)$ in the orthogonal coordinate plane , then represent geometrically the position vector $\overrightarrow{A} = -2\,\overrightarrow{M}$ by a directed line segment in the same plane.
23	If : $\overrightarrow{OC} = \left(7\sqrt{2}\ ,\frac{3\pi}{4}\right)$ is the position vector of the point C with respect to the origin point , then find the coordinates of the point C
24	In Δ ABC , D $\in \overline{BC}$ where BD : DC = 2 : 5 **Prove that :** $5\,\overrightarrow{AB} + 2\,\overrightarrow{AC} = 7\,\overrightarrow{AD}$
25	In the triangle ABC , D $\in \overline{BC}$, where BD : DC = 3 : 4 **Prove that :** $4\,\overrightarrow{AB} + 3\,\overrightarrow{AC} = 7\,\overrightarrow{AD}$
26	In any quadrilateral ABCD , **prove that :** $\overrightarrow{AB} + \overrightarrow{DC} = \overrightarrow{AC} + \overrightarrow{DB}$
27	In any quadrilateral ABCD , **Prove that :** $\overrightarrow{AB} + \overrightarrow{DC} = \overrightarrow{AC} + \overrightarrow{DB}$

28	ABCD is a quadrilateral in which $\overrightarrow{BC} = 3\ \overrightarrow{AD}$ prove that : (**1**) ABCD is a trapezium. (**2**) $\overrightarrow{AC} + \overrightarrow{BD} = 4\ \overrightarrow{AD}$
29	ABCD is a parallelogram in which E is the midpoint of $\overline{BC}$. **Prove that :** $\overrightarrow{AB} + \overrightarrow{AD} + \overrightarrow{DC} = 2\ \overrightarrow{AE}$
30	ABCD is a parallelogram **Prove that :** $\overrightarrow{AC} + \overrightarrow{DB} = 2\ \overrightarrow{AB}$
31	If : $A = (-1, 4)$, $B = (5, -2)$ Find the coordinates of the point C that divides $\overline{AB}$ internally by the ratio $1 : 2$
32	Let $A = (4, 2)$ and $B = (1, 5)$, **Find the coordinates of C which divides** $\overline{AB}$ internally at the ratio $1 : 2$
33	If : $A = (-1, 4)$, $B = (5, -1)$, find the coordinates of the point C which divides $\overline{AB}$ internally by the ratio $2 : 1$
34	If : $A = (0, -3)$ and $B = (3, 6)$ Find the coordinates of the point C which divides $\overline{AB}$ internally by the ratio $2 : 1$
35	If : $A (3, -1)$, $B (-1, -5)$, find the point C which divides $\overrightarrow{AB}$ by the ratio $1 : 3$ internally.
36	If : $A = (4, 2)$, $B = (8, -6)$, find the coordinates of the point C , which devides $\overline{AB}$ internally by the ratio $1 : 3$
37	If $A = (3, 1)$, $B = (7, -5)$, find the coordinates of the point C which divides $\overrightarrow{AB}$ internally with ratio $1 : 3$

38	If : A = (3 , 6) , B = (8 , 1) find the coordinates of point C which divides $\overrightarrow{AB}$ internally in the ratio 2 : 3
39	If : A (2 , – 1) , B (– 3 , 4) Find the coordinates of C which divides $\overrightarrow{AB}$ internally by the ratio 3 : 2
40	If A = (– 3 , 7) and B = (4 , 0) , Find the coordinates of the point M which divides $\overrightarrow{AB}$ by ratio 5 : 2 internally.
41	If : A = (2 , – 3) , B = (1 , – 1) , find the coordinates of the point C which divides $\overrightarrow{BA}$ externally by the ratio 4 : 3
42	Find the equation of the straight line which passes through the point (– 3 , 2) and is perpendicular to the straight line $3x - 2y = 7$
43	Find the equation of the straight line which passes through the point (1 , 3) and perpendicular to the straight line whose equation is $4x - 3y + 9 = 0$
44	Find the equation of the straight line that passes through (2 , – 3) and parallel to the straight line : $2x - 5y = 7$
45	Find the Cartesian equation of the straight line passing through the point (3 , – 4) and makes an angle of measure 45° with the positive direction of the x-axis.
46	Find the Cartesian equation of the straight line which passes through the point (3 , – 4) and its direction vector is (2 , – 1)
47	Write the parametric equations of the straight line passing through the point (2 , 5) and its direction vector is (3 , – 2)

48	Find the parametric equations of the straight line which makes an angle of measure 45° with the positive direction of x-axis and passes through the point $(3 , -5)$
49	Find the equation of the straight line passing through $(-3 , 5)$ and the vector $(2 , 1)$ is vector direction of it.
50	Find the general equation of the straight line which passes through the point $(3 , 1)$ and parallel to the straight line : $2x - 3y + 7 = 0$
51	If : $A (5 , -6)$, $B = (3 , 7)$ and $C = (1 , -3)$ Find the equation of the straight line passing through the point A and midpoint $\overline{BC}$
52	Find the different forms of the equation of the straight line that passes through the point $(3 , 5)$ and perpendicular to the straight line : $3x - 2y + 7 = 0$
53	Find the different forms of the equations of the straight line which passes through the point $(3 , 5)$ and perpendicular to the straight line : $3x - 2y + 7 = 0$
54	If the straight line passes through the point $(0 , 5)$ and its direction vector is $(-1 , 4)$ then **Find : (1)** The vector equation of the line. **(2)** The parametric equations of the line. **(3)** The Cartesian equation of the line.
55	Find the measure of the acute angle between the two straight lines : $x - 2y + 1 = 0$ and $x + 3y + 2 = 0$
56	**Find the measure of the acute angle between the two straight lines whose equations :** $x + 2y + 3 = 5$, $x - 3y + 1 = 0$
57	Find the measure of the acute angle between the two straight lines whose equations are : $3x - 4y + 8 = 0$, $x + 7y - 6 = 0$

58	**Find the measure of the acute angle between the two straight lines :** $3x - 4y - 11 = 0$ and $x + 7y + 5 = 0$
59	**Find the measure of the angle between the two lines :** $3x - 4y = 11$, $x + 7y + 5 = 0$
60	**Find the measure of the acute angle between the two straight lines whose slopes are :** $\frac{4}{5}$, $\frac{-1}{9}$
61	If the measure of the acute angle between the two straight lines : $x + ky - 8 = 0$, $2x - y - 5 = 0$ equals $\frac{\pi}{4}$ **Find :** the value of k
62	If the measure of the acute angle between the two straight lines whose equations $x + ky - 8 = 0$, $2x - y + 5 = 0$ equals $\frac{\pi}{4}$, then find the value of k
63	ABC is a triangle in which A (0 , 2) , B (3 , 1) , C (− 2 , − 1) **Find the measure of angle A.**
64	If the straight line whose equation is : $3x - 4y = 12$ intersects the two axes at the points A , B , find the area of Δ OAB where O is the origin point.
65	**Prove that :** the triangle whose vertices are the points Y (4 , 2) , X (3 , 5) , Z (− 5 , − 1) is a right-angled triangle at Y , then calculate the area of the triangle.
66	ABC is a triangle in which A = (3 , 2) , B = (2 , − 1) , C = (− 4 , 1) , **prove that :** Δ ABC is right angled at B , then find its area.

67	If the two straight lines $L_1 : 3x - 2y + 7 = 0$, $L_2 : ax + 3y + 5 = 0$ are perpendicular , find the value of a
68	Find the length of the radius of the circle whose center is the point $(-2 , 5)$ and touches the straight line : $3x + 4y + 1 = 0$
69	Find the intercepted parts from the two axis by the straight line whose equation is : $5x + 3y - 15 = 0$
70	Find the intercepted parts from the two axes by the straight line , whose equation is $5x + 3y = 15$
71	**Find the intercepted parts from the two axes by the straight line :** $3x + 4y - 12 = 0$
72	Find the length of the radius of the circle whose centre is the point $(-2 , 5)$ and touches the straight line $3x + 4y + 1 = 0$
73	ABCD is a parallelogram where $A(5 , 3)$, $B(4 , -2)$, $C(-2 , 3)$ Find the coordinates of the point D
74	ABCD is a parallelogram where $A(-2 , 4)$, $B(4 , 4)$, $C(6 , 1)$, find the coordinates of the point D
75	If : ABCD is a parallelogram such that $A(2 , -1)$, $B(7 , 1)$, $C(4 , 4)$, find the coordinates of point D by using vectors.
76	**Find the length of the perpendicular drawn from the point (3 , 1) to the straight line :** $3x - 4y + 5 = 0$
77	**Find the length of the perpendicular drawn from the point (1 , 2) to the straight line :** $5x - 12y - 7 = 0$

78	Find the length of perpendicular from the point (1 , 5) to the straight line $3x - 4y - 3 = 0$
79	Find the length of the perpendicular drawn from the point (2 , – 5) to the straight line , whose equation : $3x - 4y - 12 = 0$
80	Find the length of the perpendicular drawn from the point (3 , – 2) on the line : $5x - 12y + 13 = 0$
81	Find the length of the perpendicular drawn from the point (3 , – 5) to the straight line $\frac{x+1}{12} = \frac{y}{5}$
82	**Find the length of the perpendicular from the point (4 , – 5) to the straight line :** $3x - 4y + 8 = 0$
83	Find the length of the perpendicular from the point (4 , – 5) to the straight line $\vec{r} = (0 , 2) + k (4 , 3)$
84	Find the length of the perpendicular drawn from the point (5 , 2) to the straight line passing through the two points (0 , – 3) , (4 , 0)
85	If the length of the perpendicular drawn from the point (3 , 1) to the straight line $3x - 4y + c = 0$ equals 2 length unit, find the value of C
86	If the length of the perpendicular drawn from the point (4 , – 5) to the straight line $3x - 4y + c = 0$ equals 8 length unit. Find the value of c

Sec (1) : (2017)

Geometry : Term T2 : Final Revision

[A] Choose Problems Answers

Sn	Answer	Sn	Answer	Sn	Answer
1	A	20	B	39	A
2	B	21	C	40	C
3	D	22	A	41	D
4	C	23	A	42	D
5	D	24	A	43	D
6	B	25	B	44	A
7	A	26	C	45	D
8	C	27	A	46	C
9	C	28	C	47	D
10	C	29	D	48	B
11	A	30	C	49	A
12	B	31	A	50	B
13	B	32	D	51	B
14	B	33	B	52	B
15	D	34	B	53	A
16	C	35	D	54	D
17	B	36	B	55	B
18	B	37	A	56	B
19	A	38	C		

[B] Complete Problems Answers

From 1 to 4

(1) 5 (2) 90° (3) $2\overrightarrow{AC}$ (4) (9 , 5)

From 5 to 8

(1) 0 , 3 (2) ±3 (3) (−2 , 4) (4) x

From 9 to 12

(1) $-\vec{i}+7\vec{j}$ (2) 6 (3) 45° (4) $\vec{O}$

From 13 to 16

(1) (0 , 5) (2) 5

(3) $\vec{O}$ (4) (2 , −1) + K (1 , 3)

From 17 to 20

(1) $\frac{3}{2}$ (2) 5 (3) 90° (4) 45°

From 21 to 24

(1) $2\overrightarrow{AC}$ (2) $4\sqrt{5}$

(3) $\vec{r}=(3 , 5)+k(1 , 0)$ (4) 45°

From 25 to 28

(1) 5 (2) o

(3) −3 (4) $8x+5y+1=0$

From 29 to 32

(1) 6 (2) (0 , 3)

(3) 45° (4) $x=4+2k$, $y=-3+3k$

From 33 to 36

(1) (−5 , 6) (2) $\frac{x_1+x_2}{2}$, $\frac{y_1+y_2}{2}$

(3) $\vec{r}=(-4 , 3)+k(2 , 5)$ (4) $\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$

From 37 to 40

(1) $\vec{i}+7\vec{j}$ (2) 90° (3) $\frac{3}{2}$ (4) $\sqrt{2}$

From 41 to 44

(1) $\vec{i}+13\vec{j}$ (2) −6

(3) 90° (4) 2 length unit

From 45 to 48

(1) $2\overrightarrow{AC}$ (2) 4 (3) 6 square unit (4) $\frac{1}{4}$

From 49 to 52

(1) $\overrightarrow{AC}$, $\overrightarrow{BC}$ (2) 5 (3) 2 , 2 (4) (1 , 2)

From 53 to 56

(1) (12 , 60°) (2) $\vec{O}$

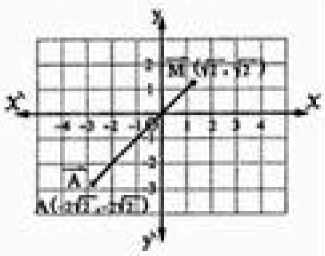
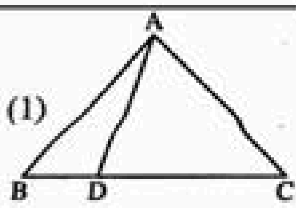
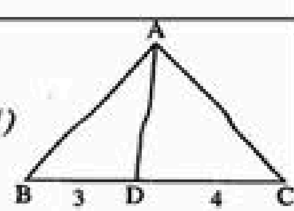
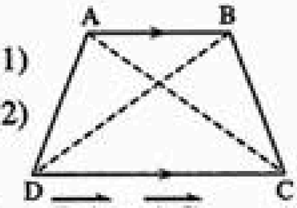
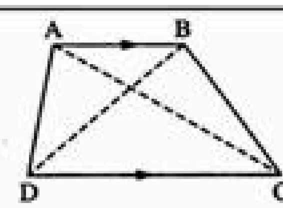
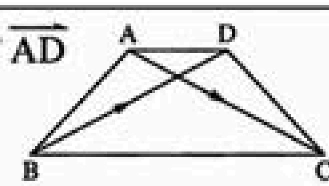
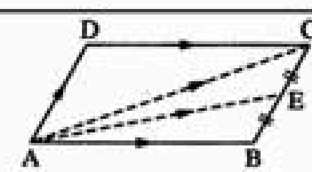
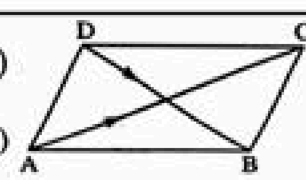
(3) $\vec{r}=(2 , -1)+k(5 , 3)$ (4) (3 , −2)

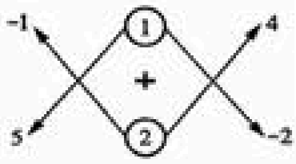
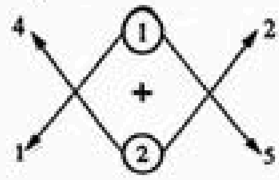
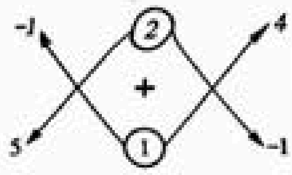
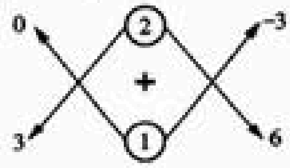
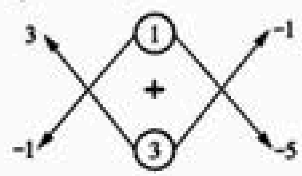
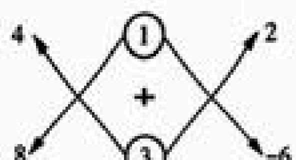
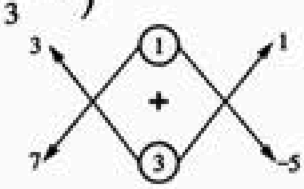
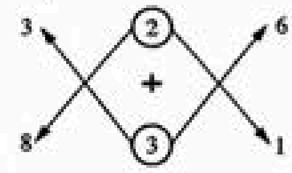
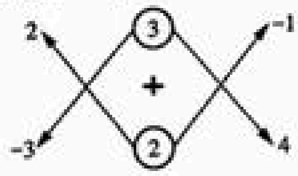
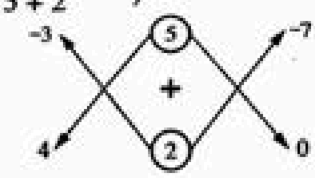
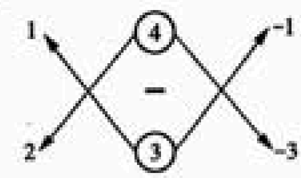
From 57 to 60

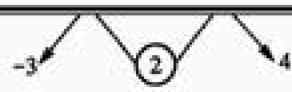
(1) 8 (2) $3\sqrt{2}$ (3) (5 , 5) (4) 6

Essay Problems

Sn.	Answer
1	$\overrightarrow{A}+2\overrightarrow{C}-\overrightarrow{B}=(1\ ,-2)+2\,(0\ ,-3)-(4\ ,0)$ $=(-3\ ,-8)$ $\therefore \Vert\overrightarrow{A}+2\overrightarrow{C}-\overrightarrow{B}\Vert=\sqrt{(-3)^2+(-8)^2}=\sqrt{73}$
2	(1) $2\overrightarrow{A}=(4\ ,-12)$ (2) $-\overrightarrow{B}=(2\ ,-5)$ (3) $\frac{1}{2}\overrightarrow{C}=(-3\ ,7)$ (4) $\overrightarrow{A}+\overrightarrow{B}-\overrightarrow{C}=(6\ ,-15)$
3	$2\overrightarrow{A}-\frac{1}{3}\overrightarrow{B}=2\,(2\ ,1)-\frac{1}{3}(3\ ,6)$ $=(4\ ,2)-(1\ ,2)=(3\ ,0)$
4	$\Vert\overrightarrow{OA}\Vert=\sqrt{(6)^2+\left(6\sqrt{3}\right)^2}=12$ $,\tan\theta=\frac{6\sqrt{3}}{6}=\sqrt{3}$ $\therefore \theta=60^\circ$ $\therefore \overrightarrow{OA}=(12\ ,60^\circ)$
5	$\Vert\overrightarrow{OA}\Vert=\sqrt{\left(8\sqrt{3}\right)^2+(8)^2}=16$ $,\tan\theta=\frac{8}{8\sqrt{3}}=\frac{1}{\sqrt{3}}$ $\therefore \theta=30^\circ$ $\therefore \overrightarrow{OA}=(16\ ,30^\circ)$
6	$\Vert\overrightarrow{OA}\Vert=\sqrt{(2)^2+(2\sqrt{3})^2}=4\ ,\tan\theta=\frac{2\sqrt{3}}{2}=\sqrt{3}$ $\therefore \theta=60^\circ$ $\therefore \overrightarrow{OA}=(4\ ,60^\circ)$
7	$\overrightarrow{C}=\left(2\ ,-2\sqrt{3}\right)+\left(-1\ ,4\sqrt{3}\right)+\left(3\ ,2\sqrt{3}\right)$ $=\left(4\ ,4\sqrt{3}\right)=4\hat{i}+4\sqrt{3}\,\hat{j}$ $\therefore \Vert\overrightarrow{C}\Vert=\sqrt{4^2+\left(4\sqrt{3}\right)^2}=8\ ,\tan\theta=\frac{4\sqrt{3}}{4}=\sqrt{3}$ $\therefore \theta=60^\circ$ $\therefore \overrightarrow{C}=(8\ ,60^\circ)$
8	$\Vert\overrightarrow{A}\Vert=\sqrt{(-3)^2+(4)^2}=5$ $,\Vert\overrightarrow{B}\Vert=\sqrt{(6)^2+(-8)^2}=10$ $,\because -3\times-8-4\times6=0$ $\therefore \overrightarrow{A}\ /\!/\ \overrightarrow{B}$
9	$\because 6\times3+(-9)\times(2)=0$ $\therefore \overrightarrow{a}\perp\overrightarrow{b}$
10	$\therefore \overrightarrow{A}\perp\overrightarrow{B}$ $\therefore 6\times-3+6\times k=0$ $\therefore k=3$
11	(1) $\overrightarrow{A}\ /\!/\ \overrightarrow{B}$ $\therefore 2\times-4-5\times k=0$ $\therefore k=\frac{-8}{5}$ (2) $\overrightarrow{A}\perp\overrightarrow{B}$ $\therefore 2\times k+5\times-4=0$ $\therefore k=10$
12	(1) $\overrightarrow{A}\ /\!/\ \overrightarrow{B}$ $\therefore -2\times m-3\times-4=0$ $\therefore m=6$ (2) $\overrightarrow{A}\perp\overrightarrow{B}$ $\therefore -2\times-4+3\times m=0$ $\therefore m=\frac{-8}{3}$
13	$\because \overrightarrow{AB}=\overrightarrow{B}-\overrightarrow{A}=(9\ ,0)-(1\ ,-2)=(8\ ,2)$ $,\overrightarrow{DC}=\overrightarrow{C}-\overrightarrow{D}=(8\ ,4)-(0\ ,2)=(8\ ,2)$ $\therefore \overrightarrow{AB}=\overrightarrow{DC}$ $,\because \overrightarrow{BC}=\overrightarrow{C}-\overrightarrow{B}=(8\ ,4)-(9\ ,0)=(-1\ ,4)$ $\therefore \overrightarrow{AB}\perp\overrightarrow{BC}$ because $\left((-1)(8)+(4)(2)=0\right)$
14	$\because -4\times-9-6\times6=0$ $\therefore \overrightarrow{A}\ /\!/\ \overrightarrow{B}$ $,\because 6\times3+(-9)\times2=0$ $\therefore \overrightarrow{B}\perp\overrightarrow{C}$
15	$\because \overrightarrow{AB}=\overrightarrow{B}-\overrightarrow{A}=(11\ ,2)-(1\ ,0)=(10\ ,2)$ $,\overrightarrow{DC}=\overrightarrow{C}-\overrightarrow{D}=(10\ ,6)-(0\ ,4)=(10\ ,2)$ $\therefore \overrightarrow{AB}=\overrightarrow{DC}$ $\therefore$ ABCD is a parallelogram.
16	(1) $\because \overrightarrow{A}\ /\!/\ \overrightarrow{B}$ $\therefore 3\times K-2\times2=0$ $\therefore K=\frac{4}{3}$ (2) $\because \overrightarrow{A}\perp\overrightarrow{B}$ $\therefore 3\times2+2\times K=0$ $\therefore K=-3$
17	(1) $\because \overrightarrow{A}\ /\!/\ \overrightarrow{B}$ $\therefore 2\times-4-4\times k=0$ $\therefore k=-2$ (2) $\because \overrightarrow{A}\perp\overrightarrow{B}$ $\therefore 2\times k+4\times-4=0$ $\therefore k=8$
18	$\because$ vector $(-1\ ,2)$ is perpendicular to the straight line $\therefore (2\ ,1)$ is a direction vector to this straight line $\therefore \overrightarrow{r}=(-3\ ,5)+k\,(2\ ,1)$ (vector form) Thus $(x\ ,y)=(-3\ ,5)+k\,(2\ ,1)$ $\therefore x=-3+2k\ ,y=5+k$ $\therefore \frac{x+3}{2}=\frac{y-5}{1}$ $\therefore x+3=2y-10$ $\therefore x-2y+13=0$ (cartesian form)

19	$\because m_1 = \frac{-2}{1} = -2$, $m_2 = \frac{-2}{1} = -2$ $\therefore m_1 = m_2$ $\therefore$ The two straight lines are parallel
20	$(50\cos 30°)\vec{i} + (50\sin 30°)\vec{j} = 25\sqrt{3}\,\vec{i} + 25\,\vec{j}$
21	$\because \vec{A} \,//\, \vec{B}$ $\quad\therefore 2 \times -9 - k \times 5 = 0$ $k = \frac{2 \times -9}{5} = -3.6$
22	$\vec{M} = \left(2\cos\frac{\pi}{4}, 2\sin\frac{\pi}{4}\right)$ $= \left(\sqrt{2}, \sqrt{2}\right)$ $\vec{A} = \left(-2\sqrt{2}, -2\sqrt{2}\right)$ 
23	$C = \left(7\sqrt{2}\cos\frac{3\pi}{4}, 7\sqrt{2}\sin\frac{3\pi}{4}\right) = (-7, 7)$
24	$\because \overrightarrow{AB} = \overrightarrow{AD} + \overrightarrow{DB}$ $\therefore 5\overrightarrow{AB} = 5\overrightarrow{AD} + 5\overrightarrow{DB}$ (1) $, \because \overrightarrow{AC} = \overrightarrow{AD} + \overrightarrow{DC}$ $\therefore 2\overrightarrow{AC} = 2\overrightarrow{AD} + 2\overrightarrow{DC}$ (2)  adding (1) , (2) $\therefore 5\overrightarrow{AB} + 2\overrightarrow{AC} = 7\overrightarrow{AD} + 5\overrightarrow{DB} + 2\overrightarrow{DC}$ $, \because \frac{BD}{DC} = \frac{2}{5}$ $\quad\therefore 5\overrightarrow{BD} = 2\overrightarrow{DC}$ $\therefore 5\overrightarrow{AB} + 2\overrightarrow{AC} = 7\overrightarrow{AD} + 5\overrightarrow{DB} + 5\overrightarrow{BD}$ $\therefore 5\overrightarrow{AB} + 2\overrightarrow{AC} = 7\overrightarrow{AD}$
25	$\because \overrightarrow{AB} = \overrightarrow{AD} + \overrightarrow{DB}$ $\therefore 4\overrightarrow{AB} = 4\overrightarrow{AD} + 4\overrightarrow{DB}$ (1) $, \because \overrightarrow{AC} = \overrightarrow{AD} + \overrightarrow{DC}$ $\therefore 3\overrightarrow{AC} = 3\overrightarrow{AD} + 3\overrightarrow{DC}$ (2)  by adding (1) , (2) $\therefore 4\overrightarrow{AB} + 3\overrightarrow{AC} = 7\overrightarrow{AD} + 4\overrightarrow{DB} + 3\overrightarrow{DC}$ $, \frac{BD}{DC} = \frac{3}{4}$ $\therefore 4\overrightarrow{BC} = 3\overrightarrow{DC}$ $\therefore 4\overrightarrow{AB} + 3\overrightarrow{AC} = 7\overrightarrow{AD} + 4\cancel{\overrightarrow{DB}} + 4\cancel{\overrightarrow{BD}}$ $\therefore 4\overrightarrow{AB} + 3\overrightarrow{AC} = 7\overrightarrow{AD}$
26	$\because \overrightarrow{AB} = \overrightarrow{AD} + \overrightarrow{DB}$ (1) $, \because \overrightarrow{DC} = \overrightarrow{DA} + \overrightarrow{AC}$ (2)  by adding (1) , (2) $\therefore \overrightarrow{AB} + \overrightarrow{DC} = (\overrightarrow{AD} + \overrightarrow{DB}) + (\overrightarrow{DA} + \overrightarrow{AC})$ $= \overrightarrow{AD} + (-\overrightarrow{AD}) + \overrightarrow{AC} + \overrightarrow{DB} = \overrightarrow{AC} + \overrightarrow{DB}$
27	$\therefore a \perp b$ $\because \overrightarrow{AB} = \overrightarrow{AD} + \overrightarrow{DB}$ (1) $, \overrightarrow{DC} = \overrightarrow{DA} + \overrightarrow{AC}$ (2)  by adding (1) , (2) $\therefore \overrightarrow{AB} + \overrightarrow{DC} = \cancel{\overrightarrow{AD}} + \overrightarrow{DB} + \cancel{\overrightarrow{DA}} + \overrightarrow{AC}$ $= \overrightarrow{AC} + \overrightarrow{DB}$
28	$\because \overrightarrow{BC} = 3\overrightarrow{AD}$ $\therefore \overrightarrow{BC} \,//\, \overrightarrow{AD}$ $\therefore$ ABCD is a trapezium  $, \because \overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$ $, \overrightarrow{BD} = \overrightarrow{BA} + \overrightarrow{AD}$ $\therefore \overrightarrow{AC} + \overrightarrow{BD} = \cancel{\overrightarrow{AB}} + \overrightarrow{BC} + \cancel{\overrightarrow{BA}} + \overrightarrow{AD}$ $= 3\overrightarrow{AD} + \overrightarrow{AD} = 4\overrightarrow{AD}$
29	$\overrightarrow{AB} + (\overrightarrow{AD} + \overrightarrow{DC})$ $= \overrightarrow{AB} + \overrightarrow{AC} = 2\overrightarrow{AE}$ 
30	$\because \overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$ (1) $, \overrightarrow{DB} = \overrightarrow{DA} + \overrightarrow{AB}$ (2)  by adding (1) , (2) $\therefore \overrightarrow{AC} + \overrightarrow{DB} = 2\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{DA}$ $, \because \overrightarrow{BC} = \overrightarrow{AD}$ $\therefore \overrightarrow{AC} + \overrightarrow{DB} = 2\overrightarrow{AB} + \cancel{\overrightarrow{AD}} + \cancel{\overrightarrow{DA}} = 2\overrightarrow{AB}$

31	$C = \left(\frac{1\times5+2\times-1}{1+2}, \frac{1\times-2+2\times4}{1+2}\right)$ $= (1, 2)$ 
32	$C = \left(\frac{1\times1+4\times2}{1+2}, \frac{1\times5+2\times2}{1+2}\right)$ $= (3, 3)$ 
33	$C = \left(\frac{2\times5+1\times-1}{2+1}, \frac{2\times-1+1\times4}{2+1}\right)$ $= \left(3, \frac{2}{3}\right)$ 
34	$C = \left(\frac{0\times1+3\times2}{2+1}, \frac{2\times6+1\times-3}{2+1}\right)$ $= (2, 3)$ 
35	$C = \left(\frac{1\times-1+3\times3}{4}, \frac{1\times-5+3\times-1}{4}\right)$ $= (2, -2)$ 
36	$C = \left(\frac{1\times8+3\times4}{1+3}, \frac{1\times-6+3\times2}{1+3}\right)$ $= (5, 0)$ 
37	$C = \left(\frac{1\times7+3\times3}{1+3}, \frac{1\times-5+1\times3}{1+3}\right)$ $= \left(4, -\frac{1}{2}\right)$ $r = \frac{\lvert 3\times-2+4\times5+1\rvert}{\dots}$ 
38	$C = \left(\frac{2\times8+3\times3}{2+3}, \frac{2\times1+3\times6}{2+3}\right)$ $= (5, 4)$ $\because m = \frac{-3}{\dots} = \frac{3}{\dots}$, $m = \frac{-1}{\dots}$ 
39	$C = \left(\frac{3\times-3+2\times2}{3+2}, \frac{3\times4+2\times-1}{3+2}\right)$ $= (-1, 2)$ $\because$ the slope $= \frac{-1}{2}$ 
40	$M = \left(\frac{5\times4+2\times-3}{5+2}, \frac{5\times0+2\times-7}{5+2}\right)$ $= (2, -2)$ 
41	$C = \left(\frac{4\times2-1\times3}{4-3}, \frac{4\times-3-3\times-1}{4-3}\right)$ $= (5, -9)$ 
42	the slope of the given st. line $= \frac{3}{2}$ the slope of the required st.line $= \frac{-2}{3}$ its equation is $\frac{y-2}{x+3} = \frac{-2}{3}$ $3y - 6 = -2x - 6$ $\therefore 3y + 2x = 0$
43	$\because$ the slope of the given straight line $= \frac{-4}{-3} = \frac{4}{3}$ $\therefore$ the slope of the required straight line $= \frac{-3}{4}$ $\therefore$ its equation is $\frac{y-3}{x-1} = \frac{-3}{4}$ $\therefore 3x + 4y - 15 = 0$
44	$\because$ The slope of the given straight line $= \frac{-2}{-5} = \frac{2}{5}$ $\therefore$ the slope of the required straight line $= \frac{2}{5}$ $\therefore$ the required equation : $\frac{y+3}{x-2} = \frac{2}{5}$ *i.e.* $5y - 2x + 19 = 0$
45	$\because$ the slope $= \tan 45° = 1$ $\therefore$ the cartesian equation is $\frac{y+4}{x-3} = 1$ *i.e.* $y - x + 7 = 0$

46	$\because$ the slope $= \frac{-1}{2}$  $\therefore$ The cartesian equation is : $\frac{y+4}{x-3} = \frac{-1}{2}$ *i.e:* $x + 2y + 5 = 0$
47	Vector equation is : $\vec{r} = (2 , 5) + k(3 , -2)$ thus : $(x , y) = (2 , 5) + k(3 , -2)$ $\therefore$ the parametric equations are : $x = 2 + 3k , y = 5 - 2k$
48	$\because$ Slope = tan 45° = 1 $\therefore$ (1 , 1) is a direction vector of the straight line $\therefore \vec{r} = (3 , -5) + k(1 , 1)$ thus $(x , y) = (3 , -5) + k(1 , 1)$ $\therefore$ the parametric equations are : $x = 3 + k , y = -5 + k$
49	$\because$ The vector equation is $\vec{r} = (-3 , 5) + k(2 , 1)$ thus $(x , y) = (-3 , 5) + k(2 , 1)$ $\therefore x = -3 + 2k , y = 5 + k$ $\therefore \frac{x+3}{2} = \frac{y-5}{1}$ $\therefore x + 3 = 2y - 10$ $\therefore x - 2y + 13 = 0$
50	$\because$ The slope of the given straight line $= \frac{-2}{-3} = \frac{2}{3}$ $\therefore$ The slope of the required straight line $= \frac{2}{3}$ $\therefore$ The general equation is : $\frac{y-1}{x-3} = \frac{2}{3}$ *i.e:* $2x - 3y - 3 = 0$
51	$\because$ The midpoint of $\overline{BC} = \left(\frac{3+1}{2} , \frac{7-3}{2}\right) = (2 , 2)$ $\therefore$ The equation of the line passing through $(5 , -6) , (2 , 2)$ is : $\frac{y-2}{x-2} = \frac{-6-2}{5-2} = \frac{-8}{3}$ i.e. $8x + 3y - 22 = 0$

52	$\because (3 , -2)$ is the perpendicular direction vector to the straight line $(3x - 2y + 7 = 0)$ $\therefore$ The required straight line passes through (3 , 5) and its direction vector is (3 , −2) $\therefore$ its vector equation is $\vec{r} = (3 , 5) + k(3 , -2)$ Thus $(x , y) = (3 , 5) + k(3 , -2)$ $\therefore$ The parametric equations $x = 3 + 3k ,$ $y = 5 - 2k$ $\therefore$ The cartesian equation : $\frac{x-3}{3} = \frac{y-5}{-2}$ *i.e.* $2x + 3y - 21 = 0$
53	$\because (3 , -2)$ is the perpendicular direction vector to the straight line $(3x - 2y + 7 = 0)$ $\therefore$ The required straight line passes through (3 , 5) and its direction vector is (3 , − 2) $\therefore$ its vector equation is $\vec{r} = (3 , 5) + k(3 , -2)$ $\therefore$ The paremetric equations $x = 3 + 3k , y = 5 - 2k$ $\therefore$ The cartesian equations $\frac{x-3}{3} = \frac{y-5}{-2}$ *i.e.* $2x + 3y - 21 = 0$
54	$\because$ The vector equation is $\vec{r} = (0 , 5) + k(-1 , 4)$ thus $(x , y) = (0 , 5) + k(-1 , 4)$ $\therefore$ the parametric equations : $x = -k , y = 5 + 4k$ $\therefore$ The cartesian equation : $\frac{x}{-1} = \frac{y-5}{4}$ *i.e.* $4x + y - 5 = 0$
55	$m_1 = \frac{1}{2} , m_2 = \frac{-1}{3}$ $\therefore \tan\theta = \left\lvert \frac{\frac{1}{2} + \frac{1}{3}}{1 - \frac{1}{6}} \right\rvert = 1$ $\therefore \theta = 45°$
56	$m_1 = \frac{-1}{2} , m_2 = \frac{-1}{-3} = \frac{1}{3}$ $\therefore \tan\theta = \left\lvert \frac{\frac{-1}{2} - \frac{1}{3}}{1 - \frac{1}{6}} \right\rvert = 1$ $\therefore \theta = 45°$
57	$\because m_1 = \frac{-3}{-4} = \frac{3}{4}$ $, m_2 = \frac{-1}{7}$ $, \because \tan\theta = \left\lvert \frac{\frac{3}{4} + \frac{1}{7}}{1 - \frac{3}{4} \times \frac{1}{7}} \right\rvert = 1$ $\therefore \theta = 45°$

58	$\because m_1 = \frac{-3}{-4} = \frac{3}{4}$, $m_2 = \frac{-1}{7}$ $\therefore \tan\theta = \left\lvert \frac{\frac{3}{4}+\frac{1}{7}}{1-\frac{3}{4}\times\frac{1}{7}} \right\rvert = 1$ $\therefore \theta = 45^\circ$
59	$\because m_1 = \frac{-3}{-4} = \frac{3}{4}$, $m_2 = \frac{-1}{7}$ $\therefore \tan\theta = \left\lvert \frac{\frac{3}{4}+\frac{1}{7}}{1-\frac{3}{4}\times\frac{1}{7}} \right\rvert = 1$ $\therefore \theta = 45^\circ$
60	$\tan\theta = \left\lvert \frac{\frac{4}{5}-\left(\frac{-1}{9}\right)}{1+\left(\frac{4}{5}\right)\left(\frac{-1}{9}\right)} \right\rvert = 1$ $\therefore \theta = 45^\circ$
61	$\because m_1 = \frac{-1}{k}$, $m_2 = \frac{-2}{-1} = 2$, $\because \tan\theta = \left\lvert \frac{m_1 - m_2}{1 + m_1 m_2} \right\rvert$ $\therefore \tan\left(\frac{\pi}{4}\right) = \left\lvert \frac{\frac{-1}{k}-2}{1-\frac{2}{k}} \right\rvert$ $\therefore \left\lvert \frac{\frac{-1}{k}-2}{1-\frac{2}{k}} \right\rvert = 1$
62	$\because m_1 = \frac{-1}{k}$, $m_2 = 2$, $\because \tan\theta = \left\lvert \frac{m_1 - m_2}{1 + m_1 m_2} \right\rvert$ $\therefore \tan 45^\circ = \left\lvert \frac{\frac{-1}{k}-2}{1-\frac{2}{k}} \right\rvert$ $\therefore \left\lvert \frac{\frac{-1}{k}-2}{1-\frac{2}{k}} \right\rvert = 1$ $\therefore \frac{\frac{-1}{k}-2}{1-\frac{2}{k}} = \pm 1$ $\therefore \frac{-1}{k} - 2 = 1 - \frac{2}{k}$ $\therefore \frac{1}{k} = 3$ $\therefore k = \frac{1}{3}$ or $\frac{-1}{k} - 2 = -1 + \frac{2}{k}$ $\therefore \frac{3}{k} = -1$ $\therefore k = -3$
63	$\because AB = \sqrt{(3-0)^2 + (1-2)^2} = \sqrt{10}$, $BC = \sqrt{(-2-3)^2 + (-1-1)^2} = \sqrt{29}$, $CA = \sqrt{(0+2)^2 + (2+1)^2} = \sqrt{13}$ $\therefore (BC)^2 > (AB)^2 + (CA)^2$ $\therefore \angle A$ is obtuse , $\because$ the slope of $\overleftrightarrow{AB} = \frac{1-2}{3-0} = \frac{-1}{3}$, the slope of $\overleftrightarrow{AC} = \frac{2+1}{0+2} = \frac{3}{2}$ $\therefore \tan\theta = \left\lvert \frac{\frac{-1}{3}-\frac{3}{2}}{1-\frac{1}{2}} \right\rvert = \frac{11}{3}$ $\theta = 74^\circ\ 44'\ 42''$ $\therefore m(\angle A) = 180^\circ - 74^\circ\ 44'\ 42'' = 105^\circ\ 15'\ 18''$

64	put $x = 0$ $\therefore 3(0) - 4y = 12$ $\therefore y = -3$ $\therefore$ the line intersects the y-axis at $(0 , -3)$, put $y = 0$ $\therefore 3x - 4(0) = 12$ $\therefore x = 4$ $\therefore$ the line intersects the x-axis at $(4 , 0)$ $\therefore$ Area of Δ OAB $= \frac{1}{2} \times 4 \times 3 = 6$ square unit
65	$\because \overrightarrow{XY} = \vec{Y} - \vec{X} = (4 , 2) - (3 , 5) = (1 , -3)$, $\overrightarrow{ZY} = \vec{Y} - \vec{Z} = (4 , 2) - (-5 , -1) = (9 , 3)$ $\therefore \overrightarrow{XY} \perp \overrightarrow{ZY}$ because $(1 \times 9 + 3 \times -3 = 0)$ $\therefore \Delta$ XYZ is aright-angled triangle at Y and its area $= \frac{1}{2} \lVert \overrightarrow{XY} \rVert \times \lVert \overrightarrow{ZY} \rVert$ $= \frac{1}{2} \times \sqrt{10} \times \sqrt{90} = 15$ square unit
66	$\because \overrightarrow{AB} = \vec{B} - \vec{A} = (2 , -1) - (3 , 2) = (-1 , -3)$, $\overrightarrow{BC} = \vec{C} - \vec{B} = (-4 , 1) - (2 , -1) = (-6 , 2)$ $\therefore \overrightarrow{AB} \perp \overrightarrow{BC}$ because $(-1 \times -6 + 2 \times -3 = 0)$ $\therefore \Delta$ABC is a right-angled triangle at B $\therefore$ its area $= \frac{1}{2} \lVert \overrightarrow{AB} \rVert \times \lVert \overrightarrow{BC} \rVert$ $= \frac{1}{2} \times \sqrt{10} \times \sqrt{40} = 10$ square unit
67	$\because m_1 = \frac{3}{2}$, $m_2 = \frac{-a}{3}$, $\because L_1 \perp L_2$ $\therefore m_1 \times m_2 = -1$ $\therefore \frac{3}{2} \times \frac{-a}{3} = -1$ $\therefore a = 2$
68	The length of the radius = the length of the perpendicular drawn from $(-2 , 5)$ to the tangent $= \frac{\lvert 3(-2) + 4(5) + 1 \rvert}{\sqrt{(3)^2 + (4)^2}} = 3$ length units
69	$\because 5x + 3y = 15$ (divide by 15) $\therefore \frac{x}{3} + \frac{y}{5} = 1$ $\therefore$ the intercepted part from x-axis = 3 units , the intercepted part from y-axis = 5 units

70

$\because 5x + 3y = 15$ (divide by 15)

$\therefore \frac{x}{3} + \frac{y}{5} = 1$

$\therefore$ The intercepted part from x-axis is 3 length unit

, The intercepted part from y-axis is 5 length unit

71

$\because 3x + 4y = 12$ (divide by 12)

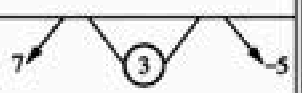
$\therefore \frac{x}{4} + \frac{y}{3} = 1$

$\therefore$ the intercepted part of the x-axis is 4 length unit

, the intercepted part of the y-axis is 3 lentgh unit

72

$r = \frac{|3 \times -2 + 4 \times 5 + 1|}{\sqrt{(3)^2 + (4)^2}}$



$= 3$ length unit

73

let $D = (x , y)$

$\because$ the midpoint of $\overline{AC} = \left(\frac{5 + (-2)}{2} , \frac{3+3}{2}\right)$

$= (1.5 , 3)$

, the midpoint of $\overline{BD} = \left(\frac{4 + x}{2} , \frac{-2 + y}{2}\right)$

, $\because$ ABCD is a parallelogram.

$\therefore \left(\frac{4 + x}{2} , \frac{-2 + y}{2}\right) = (1.5 , 3)$

$\therefore \frac{4 + x}{2} = 1.5 \quad \therefore x = -1$ and $\frac{-2 + y}{2} = 3$

$\therefore y = 8 \qquad \therefore D = (-1 , 8)$

74

Let $D = (x , y)$

$\because$ the midpoint of $\overline{AC} = \left(\frac{-2 + 6}{2} , \frac{4 + 1}{2}\right)$

$= (2 , 2.5)$

, the midpoint of $\overline{BD} = \left(\frac{4 + x}{2} , \frac{4 + y}{2}\right)$

, $\because$ ABCD is a parallelogram

$\therefore \left(\frac{4 + x}{2} , \frac{4 + y}{2}\right) = (2 , 2.5)$

$\therefore \frac{4 + x}{2} = 2 \qquad \therefore x = 0$

and $\frac{4 + y}{2} = 2.5 \qquad \therefore y = 1 \qquad \therefore D = (0 , 1)$

75

Let $D = (x , y)$

$\because$ The midpoint of $\overline{AC} = \left(\frac{2+4}{2} , \frac{-1+4}{2}\right)$

$= (3 , 1.5)$

, the midpoint of $\overline{BD} = \left(\frac{7 + x}{2} , \frac{1 + y}{2}\right)$

, $\because$ ABCD is a parallelogram.

$\therefore \left(\frac{7 + x}{2} , \frac{1 + y}{2}\right) = (3 , 1.5)$

$\therefore \frac{7 + x}{2} = 3 \qquad \therefore x = -1$

and $\frac{1 + y}{2} = 1.5 \qquad \therefore y = 2$

$\therefore D(-1 , 2)$

76

The length of the perpendicular

$= \frac{|3 \times 3 - 4 \times 1 + 5|}{\sqrt{(3)^2 + (-4)^2}} = 2$ length unit

77

$\therefore$ The length of the perpendicular

$= \frac{|5 \times 1 - 12 \times 2 - 7|}{\sqrt{(5)^2 + (-12)^2}} = 2$ length unit

78

The length of the perpendicular $= \frac{|3 \times 1 - 4 \times 5 - 3|}{\sqrt{(3)^2 + (-4)^2}}$

$= 4$ length unit

79

The length of the perpendicular

$= \frac{|3 \times 2 - 4 \times -5 - 12|}{\sqrt{(3)^2 + (-4)^2}} = 2.8$ length unit.

80

The length of the perpendicular

$= \frac{|5 \times 3 - 12 \times -2 + 13|}{\sqrt{(5)^2 + (-12)^2}} = 4$ length units

81

The equation of the given st. line is :

$\frac{x + 1}{12} = \frac{y}{5} \qquad \therefore 5x + 5 = 12y$

i.e. $5x - 12y + 5 = 0$

$\therefore$ the length of the perpendicular

$= \frac{|5 \times 3 - 12 \times -5 + 5|}{\sqrt{(5)^2 + (-12)^2}} = \frac{80}{13}$ length unit

82

the length of the perpendicular

$= \frac{|3 \times 4 - 4 \times -5 + 8|}{\sqrt{(3)^2 + (-4)^2}} = 8$ length uint

83	$\because \vec{r} = (0, 2) + k(4, 3)$ passes through $(0, 2)$ and its slope $= \frac{3}{4}$ $\therefore$ The cartesian form : $\frac{y-2}{x-0} = \frac{3}{4}$ *i.e.* $3x - 4y + 8 = 0$ $\therefore$ The length of the perpendicular from $(4, -5)$ $= \frac{\lvert 3 \times 4 - 4 \times -5 + 8 \rvert}{\sqrt{(3)^2 + (-4)^2}} = 8$ length unit.
84	The straight line passing through the two points $(0, -3), (4, 0)$ its slope $= \frac{0+3}{4-0} = \frac{3}{4}$ and its equation : $\frac{y-0}{x-4} = \frac{3}{4}$ *i.e.* $3x - 4y - 12 = 0$ $\therefore$ The length of the perpendicular drawn from $(5, 2)$ to this straight line $= \frac{\lvert 3 \times 5 - 4 \times 2 - 12 \rvert}{\sqrt{(3)^2 + (-4)^2}} = 1$ length unit
85	$\because \frac{\lvert 3(3) - 4(1) + c \rvert}{\sqrt{(3)^2 + (-4)^2}} = 2$ $\therefore \lvert 5 + c \rvert = 10$ $\therefore 5 + c = \pm 10$ $\therefore c = 5$ or -15
86	$\because \frac{\lvert 3(4) - 4(-5) + c \rvert}{\sqrt{(3)^2 + (4)^2}} = 8$ $\therefore \lvert 32 + c \rvert = 40$ $\therefore 32 + c = 40$ $\therefore c = 8$ or $32 + c = -40$ $\therefore c = -72$

Solving trigonometric equations: (1) Simple trigonometric equations

Q1: What is the general solution of $\sin\theta = 0$?

A $\frac{\pi}{2} + 2n\pi$ or $-\frac{\pi}{2} + \pi + 2n\pi$ where $n \in \mathbb{Z}$

B $\frac{\pi}{4} + 2n\pi$ or $-\frac{\pi}{4} + \pi + 2n\pi$ where $n \in \mathbb{Z}$

C $\pi + 2n\pi$ or $2n\pi$ where $n \in \mathbb{Z}$

D $\frac{\pi}{2} + 2n\pi$ or $\frac{\pi}{2} + \pi + 2n\pi$ where $n \in \mathbb{Z}$

Q2: Find the set of values satisfying $\sin^2\theta = 0$ where $90^\circ \le \theta \le 180^\circ$

A $\varnothing$ B $\{0^\circ, 180^\circ\}$ C $\{0^\circ, 180^\circ, 360^\circ\}$ D $\{180^\circ\}$

Q3: Find the set of values satisfying $\cos(\theta - 28) = \frac{1}{\sqrt{2}}$ where $0^\circ < \theta < 360^\circ$.

A $\{32^\circ, 88^\circ\}$ B $\{73^\circ, 343^\circ\}$ C $\{28^\circ, 58^\circ\}$ D $\{88^\circ, 328^\circ\}$

Q4: Find the set of values satisfying $\sin 3x = 1$, where $0 \le x < 2\pi$.

A $\left\{0, \frac{2\pi}{3}\right\}$ B $\left\{\frac{\pi}{6}, \frac{5\pi}{6}\right\}$ C $\left\{\frac{\pi}{2}, \frac{3\pi}{2}\right\}$ D $\left\{\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}\right\}$ E $\left\{\frac{\pi}{6}, 2\pi\right\}$

Q5: Find the general solution to the equation $\cos(90^\circ - \theta) = \frac{\sqrt{3}}{2}$.

A $\frac{\pi}{3} + 2\pi n$ or $\frac{2\pi}{3} + 2\pi n$ where $n \in \mathbb{Z}$ B $-\frac{\pi}{6} + 2\pi n$ or $-\frac{5\pi}{6} + 2\pi n$ where $n \in \mathbb{Z}$

C $-\frac{\pi}{3} + 2\pi n$ or $-\frac{2\pi}{3} + 2\pi n$ where $n \in \mathbb{Z}$ D $\frac{\pi}{6} + 2\pi n$ or $\frac{5\pi}{6} + 2\pi n$ where $n \in \mathbb{Z}$

Q6: Find the general solution to the equation $\sec\theta = 2$.

A $\frac{\pi}{6} + 2\pi n, -\frac{\pi}{6} + 2\pi n$, where $n \in \mathbb{Z}$ B $\frac{2\pi}{3} + 2\pi n, -\frac{2\pi}{3} + 2\pi n$, where $n \in \mathbb{Z}$

C $\frac{\pi}{3} + 2\pi n, -\frac{\pi}{3} + 2\pi n$, where $n \in \mathbb{Z}$ D $\frac{5\pi}{6} + 2\pi n, -\frac{5\pi}{6} + 2\pi n$, where $n \in \mathbb{Z}$

Q7: Find the general solution to the equation $\cot\left(\frac{\pi}{2} - \theta\right) = -1$.

A $n\pi$, where $n \in \mathbb{Z}$ B $\frac{\pi}{4} + n\pi$, where $n \in \mathbb{Z}$

C $\pi + 2n\pi$, where $n \in \mathbb{Z}$ D $\frac{3\pi}{4} + n\pi$, where $n \in \mathbb{Z}$

Q8: What is the general solution of $\cos\theta = \frac{\sqrt{2}}{2}$?

A $\frac{\pi}{6} + 2n\pi$ or $-\frac{\pi}{6} + 2n\pi$ where n is an integer.

B $\frac{\pi}{3} + 2n\pi$ or $-\frac{\pi}{3} + 2n\pi$ where n is an integer.

C $\frac{\pi}{2} + 2n\pi$ or $-\frac{\pi}{2} + 2n\pi$ where n is an integer.

D $\frac{\pi}{4} + 2n\pi$ or $-\frac{\pi}{4} + 2n\pi$ where n is an integer.

Q9: Find the set of values satisfying $\tan\left(2x + \frac{\pi}{5}\right) = -1$, where $0 \le x \le 2\pi$.

A $\left\{\frac{11\pi}{40}, \frac{31\pi}{40}\right\}$ B $\left\{\frac{11\pi}{40}, \frac{31\pi}{40}, \frac{51\pi}{40}\right\}$ C $\{0, 2\pi\}$

D $\left\{\frac{3\pi}{4}, \frac{7\pi}{4}\right\}$ E $\left\{\frac{11\pi}{40}, \frac{31\pi}{40}, \frac{51\pi}{40}, \frac{71\pi}{40}\right\}$

Q10: Find the set of values satisfying $\sin\left(2x + \frac{\pi}{3}\right) = \frac{\sqrt{2}}{2}$, where $0 \le x < 2\pi$.

A $\{0, 2\pi\}$ B $\left\{\frac{5\pi}{24}, \frac{23\pi}{24}\right\}$ C $\left\{\frac{5\pi}{24}, \frac{23\pi}{24}, \frac{29\pi}{24}, \frac{47\pi}{24}\right\}$

D $\left\{\frac{\pi}{4}, \frac{5\pi}{4}\right\}$ E $\left\{\frac{5\pi}{24}, \frac{23\pi}{24}, \frac{29\pi}{24}\right\}$

Q11: Find the set of values satisfying $\cos\left(3x + \frac{\pi}{2}\right) = \frac{1}{2}$, where $0 \le x < 2\pi$.

A $\{0, 2\pi\}$ B $\left\{\frac{7\pi}{18}, \frac{11\pi}{18}\right\}$ C $\left\{\frac{\pi}{6}, \frac{10\pi}{9}\right\}$

D $\left\{\frac{7\pi}{18}, \frac{11\pi}{18}, \frac{19\pi}{18}, \frac{23\pi}{18}\right\}$ E $\left\{\frac{7\pi}{18}, \frac{11\pi}{18}, \frac{19\pi}{18}, \frac{23\pi}{18}, \frac{31\pi}{18}, \frac{35\pi}{18}\right\}$

Q12: Find the set of values satisfying $\tan 4x = \sqrt{3}$, where $0 \le x < 2\pi$.

A $\left\{\frac{\pi}{12}, \frac{\pi}{3}, \frac{5\pi}{6}, \frac{7\pi}{12}, \frac{13\pi}{12}, \frac{4\pi}{3}, \frac{11\pi}{12}\right\}$ B $\left\{\frac{\pi}{12}, \frac{\pi}{3}, \frac{5\pi}{6}, \frac{7\pi}{12}, \frac{13\pi}{12}, \frac{4\pi}{3}, \frac{19\pi}{12}, \frac{11\pi}{6}\right\}$

C $\left\{\frac{\pi}{12}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{13\pi}{12}\right\}$ D $\left\{\frac{\pi}{12}, \frac{\pi}{3}\right\}$ E $\{0, 2\pi\}$

Q13: Find the solution set of

$\tan x + \tan 5^\circ + \tan x \tan 5^\circ = 1$, where $0^\circ < x < 360^\circ$.

A $\{40^\circ, 220^\circ\}$ B $\{40^\circ, 230^\circ\}$ C $\{50^\circ, 230^\circ\}$ D $\{50^\circ, 220^\circ\}$

Q14: Find the set of values satisfying $\tan x = -\frac{1}{\sqrt{3}}$, where $0 \le x < 2\pi$.

A $\left\{\frac{5\pi}{6}, \frac{11\pi}{6}\right\}$ B $\left\{\frac{7\pi}{6}, \frac{5\pi}{6}\right\}$ C $\{0, 2\pi\}$ D $\left\{\frac{\pi}{6}, \frac{7\pi}{6}\right\}$ E $\left\{\frac{5\pi}{6}, 2\pi\right\}$

Q15: Find the set of values satisfying $\cos x = \frac{1}{2}$, where $0 \le x < 2\pi$.

A $\left\{\frac{\pi}{3}, \frac{4\pi}{3}\right\}$ B $\left\{\frac{\pi}{3}\right\}$ C $\left\{\frac{\pi}{3}, 2\pi\right\}$ D $\left\{\frac{\pi}{3}, \frac{5\pi}{3}\right\}$ E $\{0, 2\pi\}$

Q16: Find the value of θ given $2\cos\theta + \sqrt{2} = 0$ where θ is the largest angle in the range $0^\circ \le \theta < 360^\circ$. *Answer:* ___^{o}

Q17: Find the set of values satisfying $\sin x = -\frac{\sqrt{2}}{2}$, where $0 \le x < 2\pi$.

A $\left\{\frac{5\pi}{4}, \frac{7\pi}{4}\right\}$ B $\left\{\frac{3\pi}{4}, \frac{7\pi}{4}\right\}$ C $\left\{\frac{5\pi}{4}, \frac{9\pi}{4}\right\}$ D $\left\{\frac{5\pi}{4}\right\}$ E $\{0, 2\pi\}$

Q18: Find the angle A to the nearest tenth of a degree, knowing that $\tan A = 0.2471$ and $A \in (0^\circ, 180^\circ)$. *Answer:* ___^{o}

Q19: Find the set of values satisfying $17\tan\theta + 93 = 0$ where $0^\circ \le \theta < 360^\circ$. Give the answers to the nearest second.

A $\{100^\circ21'33'', 280^\circ21'33''\}$ B $\{79^\circ38'27'', 259^\circ38'27''\}$

C $\{79^\circ38'27'', 280^\circ21'33''\}$ D $\{79^\circ38'27'', 100^\circ21'33''\}$

E $\{100^\circ21'33'', 259^\circ38'27''\}$

Q20: Find all the possible general solutions of $\tan\theta = \sqrt{3}$.

A $\frac{\pi}{3} + n\pi : n \in \mathbb{Z}$ B $\frac{\pi}{6} + n\pi : n \in \mathbb{Z}$ C $\frac{\pi}{2} + n\pi : n \in \mathbb{Z}$

D $\frac{\pi}{3} - n\pi : n \in \mathbb{Z}$ E $\frac{\pi}{4} + n\pi : n \in \mathbb{Z}$

Q21: Find the set of values satisfying $\cos 2x = -\frac{\sqrt{3}}{2}$, where $0 \le x < 2\pi$.

A $\left\{\frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}\right\}$ B $\{0, \pi\}$ C $\left\{\frac{5\pi}{12}, \frac{7\pi}{12}\right\}$

D $\left\{\frac{5\pi}{12}, \frac{7\pi}{12}, \frac{17\pi}{12}, \frac{19\pi}{12}\right\}$ E $\left\{\frac{5\pi}{6}, \frac{7\pi}{6}\right\}$

Q22: Find the values of θ that satisfy $0^\circ < \theta < 360^\circ$ where $\tan\theta = \sin 39^\circ + \cos 49^\circ 3'$ giving the answer to the nearest minute.

A $52^\circ 6'$, $127^\circ 54'$

B $52^\circ 6'$, $307^\circ 54'$

C $127^\circ 54'$, $232^\circ 6'$

D $52^\circ 6'$, $232^\circ 6'$

Q23: Find the set of values satisfying $\tan\theta = \sqrt{3}$ given $0^\circ < \theta < 360^\circ$.

A $\{60^\circ\}$

B $\{60^\circ, 240^\circ\}$

C $\{240^\circ\}$

D $\{30^\circ, 45^\circ\}$

Q24: Find the value of A given $\cos A \tan A = \dfrac{13}{25}$ where A is an acute angle. Give the answer to the nearest second.

A $27^\circ 28' 28''$

B $58^\circ 40' 4''$

C $62^\circ 31' 32''$

D $31^\circ 19' 56''$

Q25: Find the values of θ that satisfy $\cos\theta = \sin 113^\circ - 6\cos 271^\circ \tan 33^\circ$ where $0^\circ < \theta < 360^\circ$ giving the answer to the nearest minute.

A $148^\circ 29'$, $211^\circ 31'$

B $31^\circ 31'$, $211^\circ 31'$

C $148^\circ 29'$, $328^\circ 29'$

D $31^\circ 31'$, $328^\circ 29'$

<u>Answers</u> (1) C (2) D (3) B (4) D (5) A (6) C (7) D (8) D (9) E (10) C (11) E (12) B (13) A (14) A (15) D (16) 225 (17) A (18) 13.9 (19) A (20) A (21) D (22) D (23) B (24) D (25) D

Solving trigonometric equations: (2) Solving a trigonometric equations

Q1: Find the set of values satisfying $\sin^2\theta + 2\sin\theta - 3 = 0$ given $0° \le \theta < 180°$.

A $\{270°\}$ B $\{90°\}$ C $\{180°\}$ D $\{0°\}$

Q2: Find the set of values satisfying $5\cos^2\theta - 5\cos\theta = 0$ given $0° < \theta \le 360°$.

A $\{90°, 270°, 180°\}$ B $\{0°, 90°, 180°\}$
C $\{0°, 90°, 270°\}$ D $\{90°, 270°, 360°\}$

Q3: Find all the possible general solutions of $2\cos^2\theta - \sqrt{3}\cos\theta = 0$.

A $\frac{\pi}{2} + n\pi, -\frac{\pi}{2} + n\pi,\ \frac{\pi}{6} + 2n\pi, -\frac{\pi}{6} + 2n\pi: n \in \mathbb{Z}$.

B $\frac{\pi}{2} + 2n\pi, -\frac{\pi}{2} + 2n\pi,\ \frac{\pi}{6} + 2n\pi, -\frac{\pi}{6} + 2n\pi: n \in \mathbb{Z}$.

C $\frac{\pi}{2} + n\pi,\ -\frac{\pi}{6} + 2n\pi: n \in \mathbb{Z}$.

D $-\frac{\pi}{2} + n\pi,\ -\frac{\pi}{6} + 2n\pi: n \in \mathbb{Z}$.

E $\frac{\pi}{2} + n\pi,\ \frac{\pi}{6} + 2n\pi: n \in \mathbb{Z}$.

Q4: Find the set of values satisfying $\sin^2\theta - \sin\theta\cos\theta = 0$ where $0° \le \theta < 360°$. Give the answer to the nearest minute.

A $\{0°, 45°, 180°, 135°\}$ B $\{0°, 135°, 180°, 315°\}$
C $\{0°, 45°, 180°, 225°\}$ D $\{0°, 135°, 180°, 225°\}$

Q5: Find the set of values satisfying $\tan^2\theta - \sqrt{3}\tan\theta = 0$ where $0° \le \theta < 270°$.

A $\{30°, 210°, 90°, 270°\}$ B $\{60°, 240°, 0°, 180°\}$
C $\{60°, 120°, 0°, 90°\}$ D $\{240°, 300°, 0°, 180°\}$

Q6: If $0° \le \theta < 180°$, find the solution set of $2\sin\theta\cos\theta + \sin\theta = 0$.

A $\{0°, 30°\}$ B $\{90°, 120°\}$ C $\{0°, 60°\}$ D $\{0°, 120°\}$

Q7: Find the set of values satisfying $18\sin\theta + \cos\theta = 0$ where $0° < \theta < 360°$. Give the answers to the nearest second.

A $\{3°10'47'', 356°49'13''\}$ B $\{176°49'13'', 183°10'47''\}$ C $\{176°49'13'', 356°49'13''\}$
D $\{3°10'47'', 183°10'47''\}$ E $\{3°10'47'', 176°49'13''\}$

Q8: Find the set of values satisfying $2\sin\theta\cos\theta - \cos\theta = 0$ where $0^\circ < \theta < 360^\circ$.

A $\{30^\circ, 90^\circ, 120^\circ\}$ B $\{60^\circ, 90^\circ, 120^\circ\}$ C $\{60^\circ, 180^\circ, 150^\circ\}$ D $\{30^\circ, 90^\circ, 150^\circ\}$

Q9: Find the set of values satisfying $6\cos^2\theta - \cos\theta - 1 = 0$ where $0^\circ \le \theta < 360^\circ$. Give the answers to the nearest minute.

A $\{120^\circ, 300^\circ, 109^\circ 28', 289^\circ 28'\}$ B $\{60^\circ, 109^\circ 28', 300^\circ, 250^\circ 32'\}$

C $\{120^\circ, 240^\circ, 70^\circ 32', 289^\circ 28'\}$ D $\{60^\circ, 300^\circ, 70^\circ 32', 250^\circ 32'\}$

Q10: Find the set of possible solutions of $\sin^2\theta - \cos^2\theta = 0$ given $\theta \in [0^\circ, 360^\circ[$.

A $\{30^\circ, 150^\circ, 210^\circ, 330^\circ\}$ B $\{45^\circ, 135^\circ, 225^\circ, 315^\circ\}$ C $\{60^\circ, 120^\circ, 240^\circ, 300^\circ\}$

Q11: Find the set of values satisfying $2\cot^2\theta = 5$ where $0^\circ \le \theta < 360^\circ$. Give the answer to the nearest minute.

A $\{60^\circ 46', 119^\circ 14', 240^\circ 46', 299^\circ 14'\}$ B $\{32^\circ 19', 147^\circ 41', 212^\circ 19', 327^\circ 41'\}$

C $\{42^\circ 19', 137^\circ 41', 222^\circ 19', 317^\circ 41'\}$ D $\{50^\circ 46', 129^\circ 14', 230^\circ 46', 309^\circ 14'\}$

Q12: Solve the equation $\cos(180^\circ - \theta) + 3\cos^2\theta = 0.2$ for $0^\circ \le \theta \le 90^\circ$.

Write your answer approximated to the nearest angle.

A $\theta = 48^\circ$ B $\theta = 0^\circ$ C $\theta = 90^\circ$ D $\theta = 45^\circ$ E $\theta = 62^\circ$

Q13: Find all the possible solutions, that is, the general solution, of the equation $\sin\theta\cos\theta = \frac{1}{2}\sin\theta$.

A $\pm\frac{\pi}{3} + 2n\pi$ (where $n \in \mathbb{Z}$) B $n\pi, -\frac{\pi}{6} + 2n\pi$ (where $n \in \mathbb{Z}$)

C $n\pi, \frac{\pi}{3} + 2n\pi$ (where $n \in \mathbb{Z}$) D $n\pi, \pm\frac{\pi}{3} + 2n\pi$ (where $n \in \mathbb{Z}$)

E $n\pi, \pm\frac{\pi}{6} + 2n\pi$ (where $n \in \mathbb{Z}$)

Q14: Find all the possible general solutions of $\cos\theta\sin\theta = \frac{1}{2}\cos\theta$.

A $2n\pi + \frac{\pi}{2}, \frac{\pi}{6} + 2n\pi, -\frac{\pi}{6} + \pi + 2n\pi$ B $2n\pi \pm \frac{\pi}{2}, \frac{\pi}{6} + 2n\pi, -\frac{\pi}{6} + \pi + 2n\pi$

C $2n\pi \pm \frac{\pi}{2}, \frac{\pi}{6} + 2n\pi, -\frac{\pi}{6} + \pi$ D $2n\pi \pm \frac{\pi}{2}, \frac{\pi}{6} + 2n\pi, \frac{\pi}{6} + \pi + 2n\pi$

E $2n\pi - \frac{\pi}{2}, \frac{\pi}{6} + 2n\pi, -\frac{\pi}{6} + \pi + 2n\pi$

Q15: Find the set of values satisfying $2\sin\theta - \sqrt{3} = 0$ given that $0^\circ < \theta < 180^\circ$.

A $\{120^\circ, 240^\circ\}$ B $\{60^\circ, 300^\circ\}$ C $\{60^\circ, 240^\circ\}$ D $\{60^\circ, 120^\circ\}$ E $\{240^\circ, 300^\circ\}$

Q16: Find the set of values satisfying $4\cos^2\theta - 3 = 0$ given that $0^\circ < \theta < 180^\circ$.

A $\{210^\circ, 330^\circ\}$ B $\{150^\circ, 210^\circ\}$ C $\{30^\circ, 150^\circ\}$ D $\{30^\circ, 330^\circ\}$ E $\{60^\circ, 120^\circ\}$

Q17: Find the set of values satisfying $71\tan^2\theta + 80\tan\theta = 0$ where $0^\circ \le \theta < 360^\circ$. Give the answers to the nearest second.

A $\{48^\circ 24' 39'', 131^\circ 35' 21''\}$ B $\{0^\circ 0' 0'', 180^\circ 0' 0'', 131^\circ 35' 21'', 311^\circ 35' 21''\}$

C $\{0^\circ 0' 0'', 180^\circ 0' 0'', 48^\circ 24' 39'', 311^\circ 35' 21''\}$ D $\{131^\circ 35' 21'', 311^\circ 35' 21''\}$

E $\{48^\circ 24' 39'', 228^\circ 24' 39''\}$

Q18: Find all the possible general solutions of $2\sin^2\theta = \sqrt{2}\sin\theta$.

A $\pi + n\pi,\ 2n\pi,\ \frac{\pi}{4} + 2n\pi,\ -\frac{\pi}{4} + \pi + 2n\pi$ B $\pi + 2n\pi,\ n\pi,\ \frac{\pi}{4} + 2n\pi,\ -\frac{\pi}{4} + \pi + 2n\pi$

C $\frac{\pi}{4} + 2n\pi,\ -\frac{\pi}{4} + \pi + 2n\pi$ D $\pi + 2n\pi,\ 2n\pi,\ \frac{\pi}{4} + 2n\pi,\ \frac{\pi}{4} + \pi + n\pi$

E $\pi + 2n\pi,\ 2n\pi,\ \frac{\pi}{4} + 2n\pi,\ -\frac{\pi}{4} + \pi + 2n\pi$

Q19: Find the set of values satisfying $4\sin^2\theta - 3 = 0$ given that $0^\circ < \theta < 180^\circ$.

A $\{120^\circ, 240^\circ\}$ B $\{60^\circ, 300^\circ\}$ C $\{60^\circ, 240^\circ\}$ D $\{60^\circ, 120^\circ\}$ E $\{240^\circ, 300^\circ\}$

Q20: Find the set of values satisfying $2\tan^2\theta - 6 = 0$ given that $0^\circ < \theta < 180^\circ$.

A $\{60^\circ, 300^\circ\}$ B $\{60^\circ, 120^\circ\}$ C $\{120^\circ, 240^\circ\}$ D $\{60^\circ, 240^\circ\}$ E $\{240^\circ, 300^\circ\}$

Q21: Find the set of values satisfying $\tan\theta - \sqrt{3} = 0$ given that $0^\circ < \theta < 180^\circ$.

A $\{60^\circ\}$ B $\{300^\circ\}$ C $\{120^\circ\}$ D $\{30^\circ\}$ E $\{240^\circ\}$

Q22: Solve the equation $\cos(90^\circ + \theta) + 2\cos\theta = 0$ for $0^\circ \le \theta \le 90^\circ$. Write your answer approximated to the nearest angle.

A $\theta = 90^\circ$ B $\theta = 63^\circ$ C $\theta = 27^\circ$ D $\theta = 45^\circ$ E $\theta = 0^\circ$

Q23: Find all the possible solutions for the equation

$\cos(180° + \theta)\cos(90° - \theta) = -0.2\sin\theta$

for $0° \le \theta \le 180°$. Write your answers approximated to the nearest angle.

A $\theta = 0°, 45°$ B $\theta = 78°, 168°$ C $\theta = 0°, 78°$

D $\theta = 0°, 78°, 180°$ E $\theta = 0°, 180°$

Q24: If $0° \le x \le 90°$, how many solutions are there of the equation

$2\sin x = \tan x$? *Answer:* __

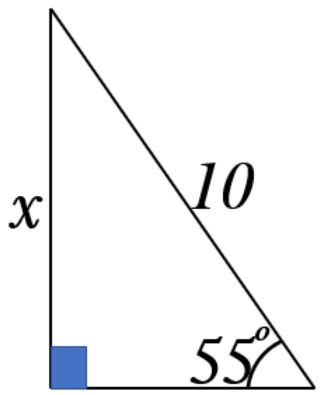
Q25: How many solutions are there of the equation $4\sin x\cos x = \sin x$ if

$0° \le x \le 90°$? *Answer:* __

Answers (1) B (2) D (3) A (4) C (5) B (6) D (7) C (8) D (9) B (10) B (11) B (12) E (13) D (14) B (15) D (16) C (17) B (18) E (19) D (20) B (21) A (22) B (23) D (24) 2 (25) 2

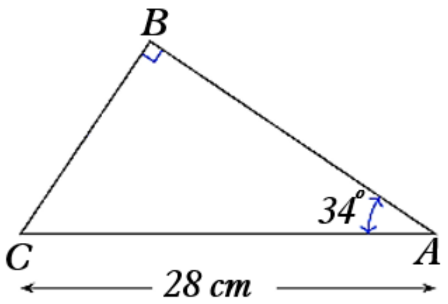
Solving the right angled triangle: (1) Right triangle trigonometry: solving for a side

Q1: Find x to two decimal places.

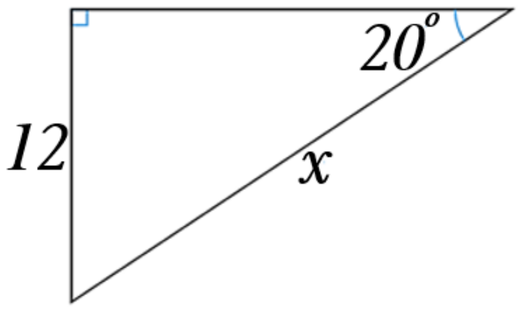


Q2: Find the length of $\overline{BC}$ giving the answer to two decimal places.

Answer : --- cm



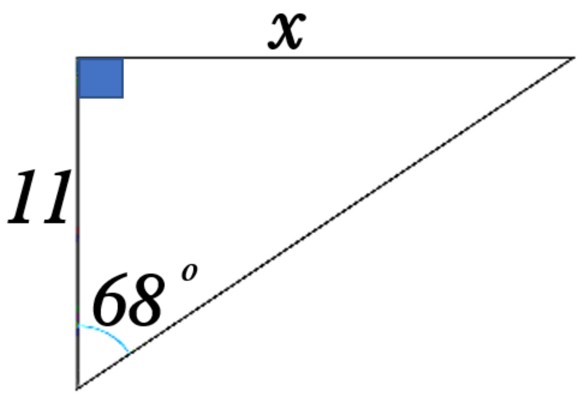
Q3: Find x to two decimal places.



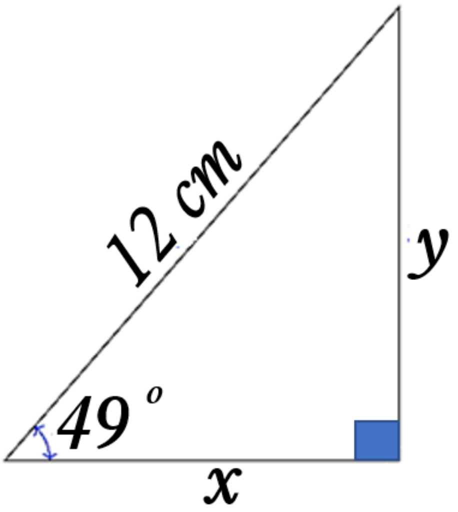
Q4: A 23 ft ladder leans against a building such that the angle between the ground and the ladder is $80°$. How high does the ladder reach up the side of the building? Give your answer to two decimal places. Answer : --- ft

Q5: A kite, which is at a perpendicular height of 51 m, is attached to a string inclined at $55°$ to the horizontal. Find the length of the string accurate to one decimal place. Answer : --- m

Q6: Find x in the given figure. Give your answer to two decimal places.



Q7: Find the values of x and y giving the answer to three decimal places.



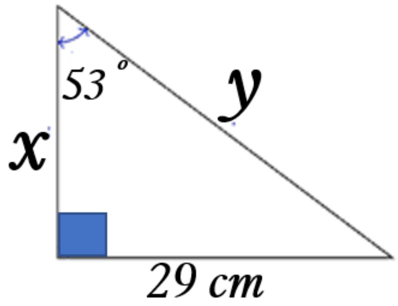
A $x = 9.057$ cm, $y = 15.034$ cm

B $x = 7.873$ cm, $y = 9.057$ cm

C $x = 9.057$ cm, $y = 7.873$ cm

D $x = 15.034$ cm, $y = 9.057$ cm

Q8: Find the values of x and y giving the answer to three decimal places.



A $x = 36.312$ cm, $y = 21.853$ cm

B $x = 46.471$ cm, $y = 36.312$ cm

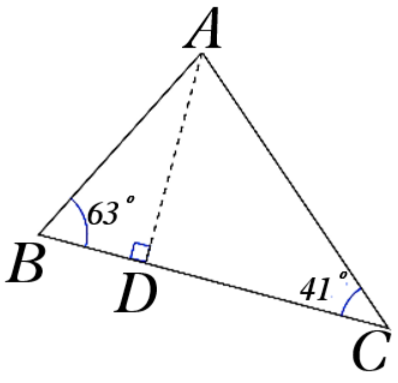
C $x = 21.853$ cm, $y = 36.312$ cm

D $x = 36.312$ cm, $y = 46.471$ cm

Q9: Find the length of $\overline{AC}$, given that ABC is a right triangle at B, where $\sin C = \dfrac{9}{13}$ and $AB = 27$ cm.

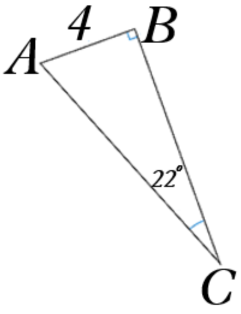
<u>Answer</u> : --- cm

Q10: In the figure $AC = 3.5$.



What is AB? Give your answer to two decimal places. <u>Answer</u> : ---

Q11: Given the following figure, find the lengths of $\overline{AC}$ and $\overline{BC}$ and the measure of $\angle BAC$ in degrees. Give your answers to two decimal places.



A $AC = 10.23$, $BC = 9.42$, $m\angle BAC = 68.00°$

B $AC = 10.68$, $BC = 9.90$, $m\angle BAC = 69.00°$

C $AC = 10.34$, $BC = 9.53$, $m\angle BAC = 70.00°$

D $AC = 10.68$, $BC = 9.90$, $m\angle BAC = 68.00°$

E $AC = 10.57$, $BC = 9.78$, $m\angle BAC = 68.00°$

Q12: ABC is a right-angled triangle at B where $m\angle C = 66°$ and $AC = 16$ cm. Find the lengths of $\overline{AB}$ and $\overline{BC}$ giving the answer to two decimal places and the measure of $\angle A$ giving the answer to the nearest degree.

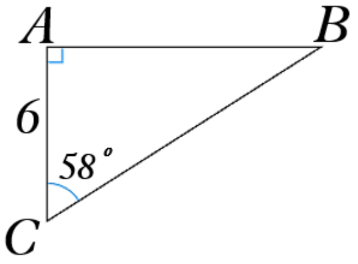
A $AB = 14.62$ cm, $BC = 6.51$ cm, $m\angle A = 24°$

B $AB = 6.51$ cm, $BC = 14.62$ cm, $m\angle A = 34°$

C $AB = 14.62$ cm, $BC = 6.51$ cm, $m\angle A = 34°$

D $AB = 6.51$ cm, $BC = 14.62$ cm, $m\angle A = 24°$

Q13: Given the following figure, find the lengths of $\overline{AB}$ and $\overline{BC}$ and the measure of $\angle ABC$ in degrees. Give your answers to two decimal places.



A $AB = 8.70$, $BC = 10.57$, $m\angle ABC = 32.00°$

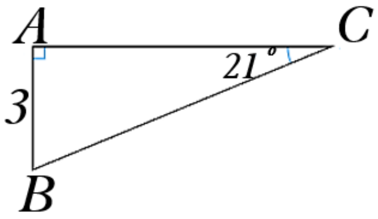
B $AB = 5.09$, $BC = 7.86$, $m\angle ABC = 32.00°$

C $AB = 9.88$, $BC = 11.56$, $m\angle ABC = 35.00°$

D $AB = 9.32$, $BC = 11.08$, $m\angle ABC = 37.00°$

E $AB = 9.60$, $BC = 11.32$, $m\angle ABC = 32.00°$

Q14: Given the following figure, find the lengths of $\overline{AC}$ and $\overline{BC}$ and the measure of $\angle ABC$ in degrees. Give your answers to two decimal places.



A $AC = 7.82$, $BC = 8.37$, $m\angle ABC = 69.00°$

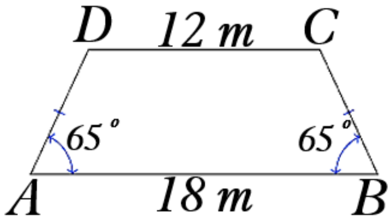
B $AC = 7.22$, $BC = 7.82$, $m\angle ABC = 69.00°$

C $AC = 7.32$, $BC = 7.91$, $m\angle ABC = 72.00°$

D $AC = 7.95$, $BC = 8.19$, $m\angle ABC = 60.00°$

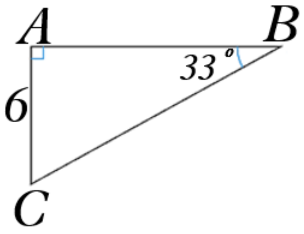
E $AC = 7.62$, $BC = 8.19$, $m\angle ABC = 70.00°$

Q15: A swimming pool is in the shape of a trapezium. Find the area of the trapezium giving the answer to the nearest square metre.



Answer : --- m^2

Q16: Given the following figure, find the lengths of $\overline{AB}$ and $\overline{BC}$ and the measure of $\angle ACB$ in degrees. Give your answers to two decimal places.



A $AB = 10.87$, $BC = 12.42$, $m\angle ACB = 57.00°$

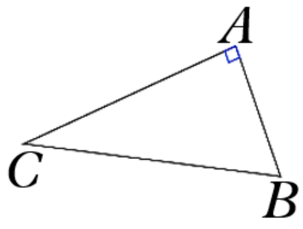
B $AB = 9.24$, $BC = 11.02$, $m\angle ACB = 56.00°$

C $AB = 4.82$, $BC = 10.42$, $m\angle ACB = 57.00°$

D $AB = 10.87$, $BC = 12.42$, $m\angle ACB = 60.00°$

E $AB = 9.24$, $BC = 11.02$, $m\angle ACB = 57.00°$

Q17: In the given figure, given that $AC = 10$ and $m\angle ACB = 50^\circ$, find the lengths of $\overline{AB}$ and $\overline{BC}$ and the measure of $\angle ABC$ in degrees. Give your answers to two decimal places.



A $AB = 7.66$, $BC = 12.60$, $m\angle ABC = 41.00^\circ$

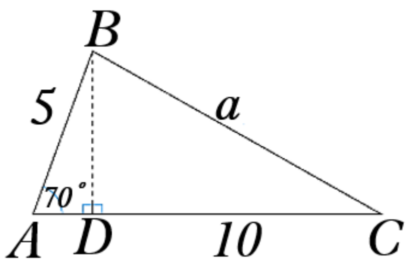
B $AB = 6.42$, $BC = 11.88$, $m\angle ABC = 40.00^\circ$

C $AB = 8.39$, $BC = 13.05$, $m\angle ABC = 38.00^\circ$

D $AB = 11.92$, $BC = 15.56$, $m\angle ABC = 40.00^\circ$

E $AB = 11.92$, $BC = 15.56$, $m\angle ABC = 42.00^\circ$

Q18: In the given figure, $AB = 5$, $BC = a$, and $AC = 10$. Unless otherwise stated, give all solutions to the following questions to four decimal places.



Work out the length of $\overline{AD}$ and $\overline{DC}$.

A 2.8512, 7.1488 B 3.2184, 6.7816

C 1.7101, 8.2899 D 3.2899, 6.7101

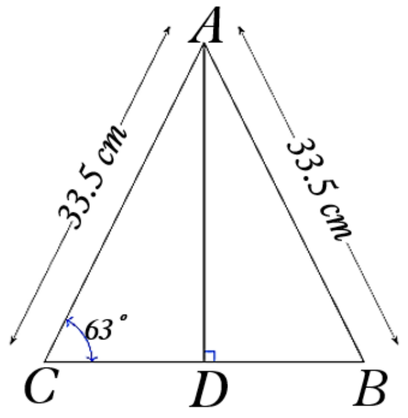
E 4.6985, 5.3015

Using the Pythagorean theorem, or otherwise, calculate $(BD)^2$.

Work out a. Give your answer to two decimal places.

Q19: ABC is an isosceles triangle where $AB = AC = 33.5$ cm, $\overline{AD} \perp \overline{BC}$ and $m\angle C = 63^\circ$.

Find the length of $\overline{BC}$ giving the answer to one decimal place. <u>Answer</u> : --- *cm*



Q20: ABC is a right-angled triangle at B where $BC = 18$ cm and $m\angle A = 66^\circ$. Find the lengths of $\overline{AC}$ and $\overline{AB}$ and the measure of $\angle C$.

A $AC = 19.70$ cm, $AB = 8.01$ cm, $m\angle C = 34^\circ$

B $AC = 8.01$ cm, $AB = 19.70$ cm, $m\angle C = 34^\circ$

C $AC = 8.01$ cm, $AB = 19.70$ cm, $m\angle C = 24^\circ$

D $AC = 19.70$ cm, $AB = 8.01$ cm, $m\angle C = 24^\circ$

Q21: ABC is a right-angled triangle at B where $AB = 28$ cm and $m\angle A = 52°$. Find the lengths AC and BC giving the answer to two decimal places and the measure of angle C giving the answer to the nearest degree.

- A $AC = 21.88$ cm, $BC = 35.53$ cm, $m\angle C = 48°$
- B $AC = 35.53$ cm, $BC = 21.88$ cm, $m\angle C = 48°$
- C $AC = 21.88$ cm, $BC = 35.53$ cm, $m\angle C = 38°$
- D $AC = 45.48$ cm, $BC = 35.84$ cm, $m\angle C = 38°$

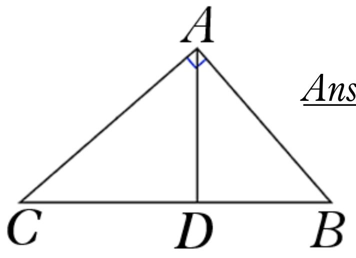
Q22: ABC is a right-angled triangle at B where $m\angle C = 1.102$ rad and $AC = 14$ cm. Find $m\angle A$ in radians and lengths AB and BC giving all answers to three decimal places.

- A $m\angle A = 0.469$ rad, $AB = 12.490$ cm, $BC = 6.325$ cm
- B $m\angle A = 0.469$ rad, $AB = 12.490$ cm, $BC = 27.643$ cm
- C $m\angle A = 1.102$ rad, $AB = 12.490$ cm, $BC = 12.490$ cm
- D $m\angle A = 0.643$ rad, $AB = 6.325$ cm, $BC = 12.490$ cm

Q23: A rectangle has a diagonal of 30 units which divides it into two congruent 30-60-90 triangles. What are the lengths of the short side and the long side of the rectangle?

- A short side = 15 units, long side = $15\sqrt{3}$ units
- B short side = $5\sqrt{2}$ units, long side = 15 units
- C short side = $15\sqrt{3}$ units, long side = 15 units
- D short side = $10\sqrt{3}$ units, long side = $5\sqrt{3}$ units
- E short side = $5\sqrt{3}$ units, long side = $10\sqrt{3}$ units

Q24: The governor of a city decided to build a new metro station at point D between two existing stations at points B and C. The distance between D and B is 1.7 km, and the shortest distance between D and the library at point A is 2 km. Find the distance between points D and C, given that $\overline{AC}$ and $\overline{AB}$ are orthogonal. Give your answer to two decimal places.



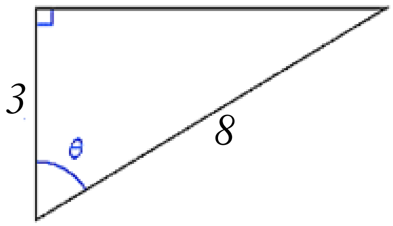
Answer : ---

Q25: A kite has a string of length 54 meters. The angle the string makes with the horizontal ground is $40°$. Find the height of the kite from the ground giving the answer to two decimal places.

Answers (1) 8.19 (2)15.66 (3)35.09 (4)22.65 (5) 62.3 (6) 27.23 (7) B (8) C
(9) 39 (10) 2.58 (11) D (12) A (13) E (14) A
(15) 97 (16) E (17) D (18) C, 22.0756 ,9.53
(19) 30.4 (20) D (21) D (22) A (23) A (24) 2.35 (25) 34.71

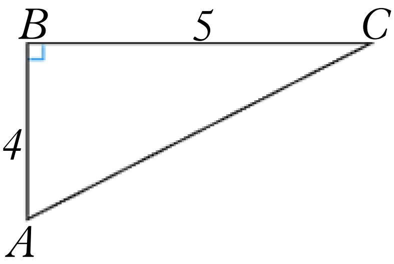
Solving the right angled triangle: (2) Right triangle trigonometry: solving for an angle

Q1: For the given figure, find the measure of angle θ, in degrees, to two decimal places.



Answer: __ ^{o}

Q2: For the given figure, find the measures of $m\angle ACB$ and $m\angle BAC$, in degrees, to two decimal places.



- A $m\angle ACB = 53.13°, m\angle BAC = 36.87°$
- B $m\angle ACB = 38.66°, m\angle BAC = 51.34°$
- C $m\angle ACB = 51.34°, m\angle BAC = 38.66°$
- D $m\angle ACB = 36.87°, m\angle BAC = 53.13°$
- E $m\angle ACB = 37.99°, m\angle BAC = 52.01°$

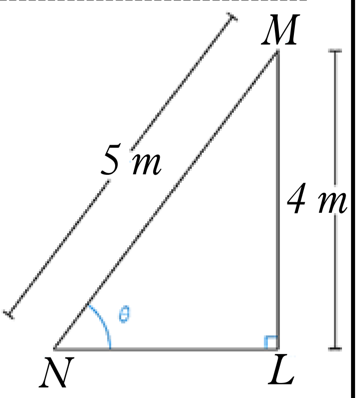
Q3: ABC is a right-angled triangle at B, where $BC = 13.8$ cm and $AC = 19$ cm. Find the length AB, giving the answer to the nearest centimeter, and the size of angles A and C, giving the answer to the nearest degree.

- A $AB = 13$ cm, $\angle A = 37°$, $\angle C = 53°$
- B $AB = 13$ cm, $\angle A = 47°$, $\angle C = 43°$
- C $AB = 13$ cm, $\angle A = 48°$, $\angle C = 42°$
- D $AB = 13$ cm, $\angle A = 36°$, $\angle C = 54°$

Q4: A 5 m ladder is leaning against a vertical wall such that its base is 2 m from the wall. Work out the angle between the ladder and the floor, giving your answer to two decimal places.

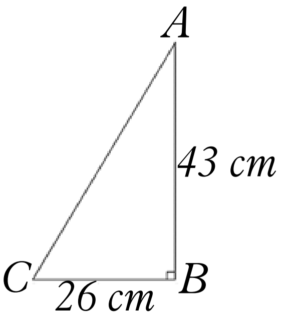
- A $x = 68.19°$
- B $x = 23.57°$
- C $x = 66.42°$
- D $x = 21.8°$

Q5: The height of a ski slope is 4 meters and the length is 5 meters. Find the measure of $\angle\theta$ giving the answer to two decimal places.



Answer: __ ^{o}

Q6: Find the measure of $\angle ACB$, giving the answer to the nearest second.



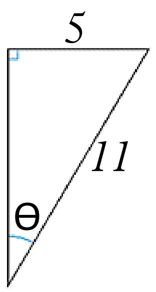
- A $42°17'37''$
- B $38°12'13''$
- C $52°47'47''$
- D $31°9'33''$

Q7: A car is going down a ramp that is 44 metres high and 87 metres long. Find the angle between the ramp and the horizontal, giving the answer to the nearest second.

- A $59°37'9''$
- B $26°49'40''$
- C $30°22'51''$
- D $63°10'20''$
- E $73°23'38''$

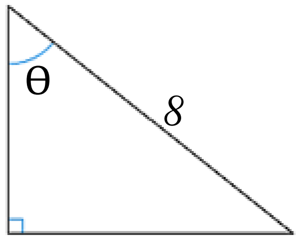
Q8: In the given figure, find the measure of angle θ, in degrees, to two decimal places.

Answer: $\_\_^{o}$



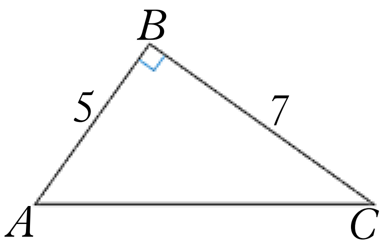
Q9: Find the measure of angle θ, in degrees, to two decimal places.

Answer: $\_\_^{o}$

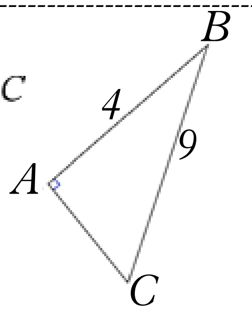


Q10: For the given figure, find the measure of $\angle BAC$, in degrees, to two decimal places.

Answer: $\_\_^{o}$

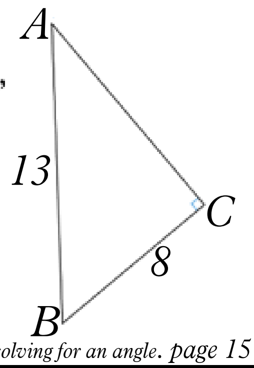


Q11: For the given figure, find the measures of $\angle ABC$ and $\angle ACB$, in degrees, to two decimal places.

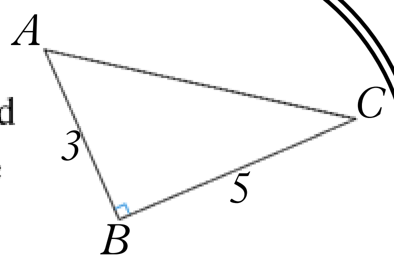


- A $m\angle ABC = 66.03°$, $m\angle ACB = 23.96°$
- B $m\angle ABC = 63.61°$, $m\angle ACB = 26.39°$
- C $m\angle ABC = 26.39°$, $m\angle ACB = 63.61°$
- D $m\angle ABC = 26.57°$, $m\angle ACB = 63.43°$
- E $m\angle ABC = 63.43°$, $m\angle ACB = 26.57°$

Q12: For the given figure, find the measure of $\angle BAC$, in degrees, to two decimal places. *Answer:* $\_\_^{o}$



Q13: Given the following figure, find $m\angle BAC$ and $m\angle ACB$ and the length of $\overline{AC}$. Give your answers to two decimal places.

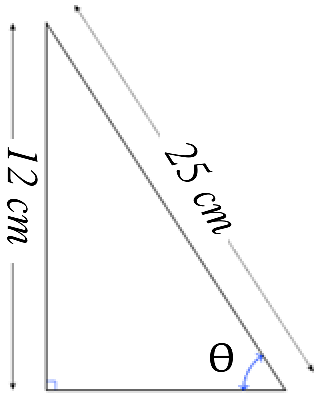


- A $m\angle BAC = 59.04°$, $m\angle ACB = 30.96°$, $AC = 8.29$
- B $m\angle BAC = 36.87°$, $m\angle ACB = 53.13°$, $AC = 6.78$
- C $m\angle BAC = 59.04°$, $m\angle ACB = 30.96°$, $AC = 5.83$
- D $m\angle BAC = 36.35°$, $m\angle ACB = 53.65°$, $AC = 4.52$
- E $m\angle BAC = 53.13°$, $m\angle ACB = 36.87°$, $AC = 5.38$

Q14: ABC is a right triangle at B, where $BC = 5$ cm and $AB = 12$ cm. Find the length of $\overline{AC}$ and the measures of $\angle A$ and $\angle C$ to the nearest degree.

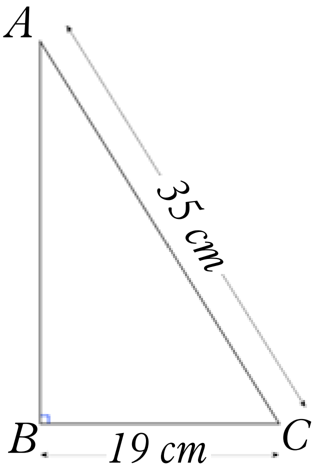
- A $AC = 14$ cm, $m\angle A = 24°$, $m\angle C = 66°$
- B $AC = 14$ cm, $m\angle A = 66°$, $m\angle C = 24°$
- C $AC = 13$ cm, $m\angle A = 67°$, $m\angle C = 23°$
- D $AC = 13$ cm, $m\angle A = 23°$, $m\angle C = 67°$
- E $AC = 13$ cm, $m\angle A = 25°$, $m\angle C = 65°$

Q15: Find the measure of $\angle\theta$ giving the answer to the nearest second.



A	$49°58'11''$
B	$32°51'36''$
C	$57°8'24''$
D	$40°1'49''$

Q16: Find the value of $\angle ACB$ giving the answer to the nearest second.



A	$57°7'18''$
B	$28°29'44''$
C	$32°52'42''$
D	$61°30'16''$

Q17: ABC is a right-angled triangle at B where $AB = 41$ cm and $BC = 43$ cm. Find the length of $\overline{AC}$ to two decimal places and then the measure of angles A and C to the nearest second.

A. $AC = 12.96$ cm, $m\angle A = 43°38'10''$, $m\angle C = 46°21'50''$

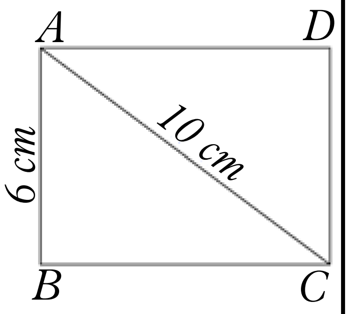
B. $AC = 59.41$ cm, $m\angle A = 17°32'37''$, $m\angle C = 46°21'50''$

C. $AC = 59.41$ cm, $m\angle A = 43°38'10''$, $m\angle C = 46°21'50''$

D. $AC = 59.41$ cm, $m\angle A = 46°21'50''$, $m\angle C = 43°38'10''$

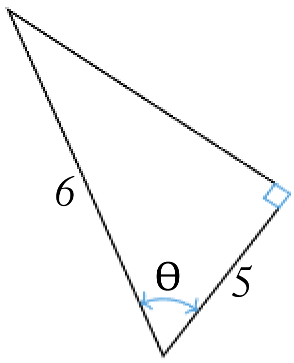
Q18: Find $m\angle A$, given that ABC is a right triangle at B, where $\sqrt{2}CB = AC$. *Answer:* __ ^{o}

Q19: Find the measure of $\angle ACB$ given $ABCD$ is a rectangle where $AB = 6$ cm and $AC = 10$ cm. Give the answer to the nearest second.



A	$53°7'48''$	B	$48°35'25''$
C	$30°57'50''$	D	$36°52'12''$

Q20: For the given figure, find angle θ, in degrees, to two decimal places.



Answer: __ ^{o}

Q21: XYZ is a right-angled triangle at Y, where $XY = 10.8$ cm, $YZ = 23.1$ cm, and $XZ = 25.5$ cm. Find the measure of $\angle X$ giving the answer to the nearest second.

A	$25°3'27''$	B	$22°57'15''$
C	$42°10'22''$	D	$64°56'33''$

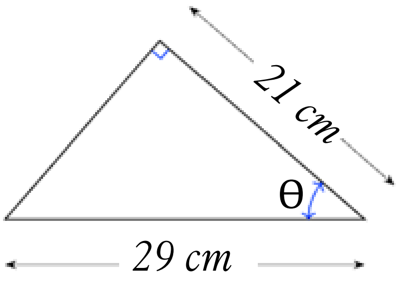
Q22: Find the measure of $\angle\theta$ giving the answer to the nearest second.

A $35°54'35''$

B $54°5'25''$

C $43°36'10''$

D $46°23'50''$



Q23: A car is going down ramp which is 4 meters high and 43 meters long. Find the angle between the ramp and the horizontal giving the answer to the nearest second.

A $84°39'45''$

B $95°20'15''$

C $15°20'15''$

D $5°20'15''$

Q24: A palm tree snaps due to bad winds. The vertical trunk is 5 metres tall and the inclined part is 9 metres. Find the measure of the angle between the inclined part and the ground giving the answer to the nearest second.

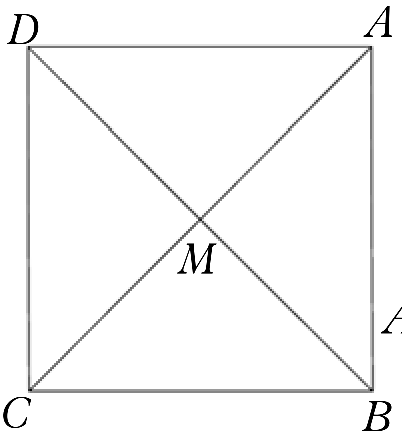
A $33°44'56''$

B $56°15'4''$

C $29°3'17''$

D $60°56'43''$

Q25: $ABCD$ is a rhombus whose diagonals intersect at the point M where $AB = 17$ cm and $AM = 12$ cm. Find the value of $\angle BAD$ giving the answer to the nearest second.



Answer: ___

Answers (1) 67.98 (2) B (3) B (4) C (5) 53.13 (6) E (7) C (8) 27.04 (9) 51.32 (10) 54.46 (11) B (12) 37.98 (13) C (14) D (15) C (16) A (17) C (18) 45 (19) D (20) 33.56 (21) D (22) C (23) D (24) A (25) C

نفذ أ/ خالد محمد نعيم تغييرات على الرسوم البيانية وذلك لعدم وضوح الرسوم من المصدر

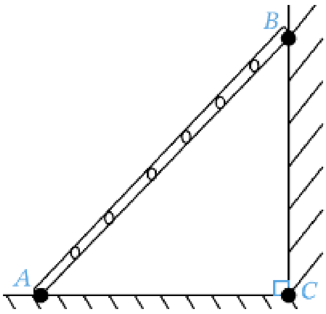
Angles of Elevation and Angles of Depression

Q1: In the given diagram of a ladder leaning against a wall, which of the following angles represents the ladder's angle of elevation?

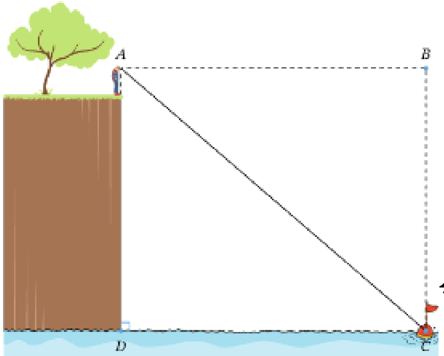
A $\angle ACB$

B $\angle ABC$

C $\angle BAC$



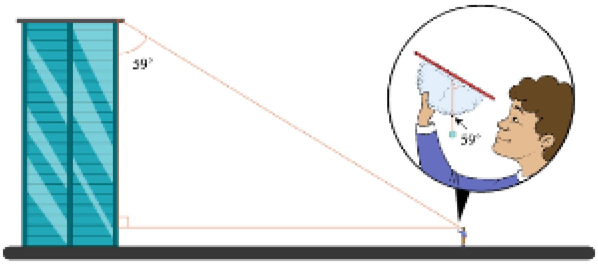
Q2: In the given diagram, Amer observes a buoy in the sea below him from a point 6 ft above a 45 ft cliff. He has been told that the perpendicular distance from the buoy to the base of the cliff is 60 ft. What is the angle of depression, in degrees, from Amer to the buoy? Give your solutions to two decimal places.



Answer : ---°

Q3: A boat is 237 m away from the base of a cliff which is 212 m high. Find the measure of the angle of depression from the top of the cliff to the boat. Give the answer in radians to two decimal places. Answer : --- rad

Q4: Amer wants to find the height of a tower. He decides he needs to make a clinometer in order to measure the angle of elevation. He uses a straw, a protractor, some string, and a bit of Blu-Tack as a weight. Amer stands at a perpendicular distance of 100 ft from the base of the tower and measures the angle on his clinometer to be 59°, as seen in the diagram.



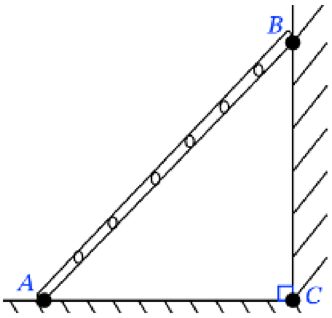
Work out the angle of elevation.

Answer : ---°

Given that Amer's eyeline is 6 ft from the ground, work out the height of the tower to the nearest foot.

Answer : --- ft

Q5: In the given diagram, a 15 ft ladder is leaning against a wall with an angle of elevation of $70°$. How high up the wall would it reach? Give your answer to two decimal places.



Answer : --- *ft*

Q6: A man observes a stationary car from the top of a building. The car is on the same horizontal plane as the base of the building and 76 meters away. The angle of depression from the man to the car is $61°36'$. Find the height of the building, giving the answer to one decimal place.

Answer : --- *m*.

Q7: A 90-foot tall building has a shadow that is 2 feet long. What is the angle of elevation of the sun?

Answer : --- °.

Q8: A flag is hung 26 meters up a flagpole. As the flag is raised, the angle of elevation from a point 25 meters away from the base of the flagpole to the flag is $66°$. Find the increase in height of the flag giving the answer to two decimal places.

Answer : --- *m*

Q9: Karim stands 54 m from a building that is 23 m high. What is the angle of elevation from Karim to the top of the building? Round your answer to the nearest degree. *Answer* : --- °.

Q10: A rocket is launched vertically upward. A woman, standing 4 miles from the launch pad, watches its flight. What is the angle of elevation of the rocket from the woman when its altitude is 11 miles? *Answer* : --- °.

Q11: A ladder is leaning against a vertical wall such that the top is 9 m above the ground and its base is 3 m from the bottom of the wall. Find the measure of the angle between the ladder and the ground. Give your answer to two decimal places. *Answer* :--°.

Q12: A man who is 1.9 metres tall is standing in front of a 3.6-meter-high lamppost. When the lamppost is turned on, the man's shadow is 2.7 metres long. Find the distance between the man and the base of the lamppost, giving the answer to two decimal places.

- A 3.22 metres
- B 1.52 metres
- C 5.12 metres
- D 1.28 metres
- E 2.42 metres

Q13: If you drive 0.6 miles along the road and your altitude increases by 150 feet, what is the angle of inclination of the road? Give your answer to two decimal places. Note that 1 mile = 5 280 feet. *Answer :* -- °.

Q14: A mountain is 8.45 km tall from the ground. The angle of elevation of the top of the mountain from a point on the ground is $39°$. Find the distance between the point on the ground and the top of the mountain giving the answer to the nearest metre.

A	10 873 m	B	13 427 m
C	10 435 m	D	5 318 m
E	6 843 m		

Q15: A person is trying to estimate the height of the Eiffel Tower. He measured a distance of 250 m from the base of the tower. From that point, he measured the angle of elevation to the top of the tower to be $52°$. Use these measurements to approximate the height of the tower to the nearest meter. *Answer :* --- *meters.*

Q16: A boat is 710 metres away from the base of a 600-metre high cliff. Find the angle of depression of the boat from the top of the cliff giving the answer, in radians, to three decimal places. *Answer :* --- *rad.*

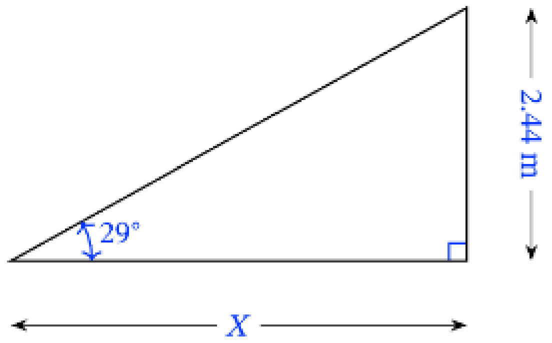
Q17: A ladder is leaning against a wall where the upper end is 5.4 m from the ground. The angle of inclination of the ladder to the ground is $25°$. Find the horizontal distance between the base of the ladder and the wall giving the answer to two decimal places.

Answer : --- *m.*

Q18: A truck traveled 1.2 km up a ramp that is inclined to the horizontal at an angle of $25°18'$. Find the height at which the truck stopped, giving the answer in meters to one decimal place.

Answer : --- *m.*

Q19: A footballer kicks a ball into a goal post. The angle of elevation between the trajectory of the ball and the pitch is $29°$. The ball hits the top of the goal post at a height of 2.44 m. Find the horizontal distance X between the footballer and the goal giving the answer to two decimal places.



Answer : --- *m.*

Q20: A person observes a point on the ground from the top of a hill that is 1.02 km high. The angle of depression is $64°$. Find the distance between the point and the observer giving the answer to the nearest metre.

A	2 m	B	1 135 m	C	497 m
D	2 327 m	E	1 m		

Q21: If a 20-feet building has a 55-foot shadow, what is the angle of elevation of the top of the building from the tip of the shadow? *Answer : ---°*

Q22: A ladder is leaning against a wall where the upper end is 5.5 m high from the ground. The angle of inclination of the ladder to the ground is $49°$. Find the length of the ladder giving the answer to two decimal places. *Answer : --- m.*

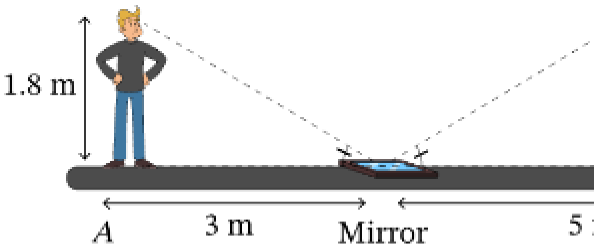
Q23: A plane took off from a runway at an angle of elevation of $15°$. It continued to climb at the same constant angle. After 45 seconds, the plane reached a perpendicular height of 1 500 metres. What distance has the plane travelled in this time? Give your answer to two decimal places.

A	1 552.91 metres	B	5 795.55 metres
C	401.92 metres	D	5 393.38 metres
E	5 598.08 metres		

Q24: A palm tree 14.6 meters tall is observed from a point 7 meters away on the same horizontal plane as the base of the tree. Find the angle of elevation to the top of the palm tree giving the answer to the nearest minute.

A	$25°37'$	B	$61°21'$
C	$28°39'$	D	$64°23'$

Q25: Fares wants to find the height of a lamp post outside his house. He stands at a fixed point A and asks a friend to place a mirror between him and the post in a position where he can see the top of the post exactly from his eye level (this ensures that the angles to and from the mirror are equal). His friend then measures that the distance from Fares to the mirror is exactly 3 m and that the distance from the mirror to the post is exactly 5 m. Using the fact that Fares's eye level is exactly 1.8 m from the ground, calculate the height of the post. Use the diagram to help you.



Answers (1) C (2) 40.36 (3) 0.73 (4) 31, 66 (5) 14.10 (6) 140.6 (7) 88.73(8) 30.15 (9) 23 (10) 70.02 (11) 71.57(12) E (13) 2.71 (14) B (15) 320 (16) 0.869 (17) 11.58 (18) 512.8 (19) 4.40 (20) B (21) 19.98 (22) 7.29 (23) B (24) D (25) 3

1-Complete:

a-If $A = (9,4)$, $B = (0,16)$, $C = (0,0)$, then the surface area of the triangle $ABC =$.................$square\ unit.$

b-The area of circular sector whose perimeter is $12cm$.and its arc length is $4cm$ $equals$ ... ...cm^2.

c-If $A = \begin{pmatrix} 1 & 2 \\ 3 & -2 \end{pmatrix}$, then $A^2 = \cdots$ and $A^{-1} = \cdots$

d-If ABC is a right-angled triangle at B and $m(\hat{A}) = 3\theta, m(\hat{C}) = \theta$ $AC = 10cm$, $then\ BC = \cdots cm.$

e-If $\begin{pmatrix} 1 & x & 2 \\ -1 & 6 & 5 \end{pmatrix} = \begin{pmatrix} 1 & -1 \\ -3 & 6 \\ 2 & y \end{pmatrix}^t$, then $xy = \cdots$

f-The surface area of the triangle ABC in which $AB = 8cm$,$BC = 11cm$, $m(\hat{B}) = 60^o$ equals.........cm^2 (to the nearest cm^2).

g-The S.S of the equation $\sin x + \cos x = 0$ where, $180^0 < x < 360^0$ is................

h-The value of the determinant $\begin{vmatrix} 2 & 0 & 0 \\ -1 & 3 & 0 \\ 4 & 2 & 5 \end{vmatrix}$ equals............

i-The area of the convex quadrilateral whose diagonal lengths are $12cm$ and $8cm$ and the measure of the angle included between them is 30^0 equals..................cm^2.

j-The simplest form of$(\sin\theta + \cos\theta)^2 - 2\sin\theta\cos\theta$ is...........

2-Find the minimum value of the objective function : $P = 3x + 2y$

under the restrictions: $2x - y \le 4$, $2x + 3y \ge 12$, $y \le 6$, $x \ge 0$.

3-Solve the following two equations using the inverse of the

matrix: $2x + 3y = 3$, $3x + 4y = 3$.

4-Prove that : $(\sec\theta - \tan\theta)^2 = \frac{1-\sin\theta}{1+\sin\theta}$.

5-Find the area of the circular segment whose chord length= $48cm$

and the radius length of its circle is $25cm$.

6-If $A = \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix}$, $B = \begin{pmatrix} -1 & 0 \\ 2 & 4 \end{pmatrix}$, then check that $(AB)^t = B^t A^t$.

7-Solve the system of the following equations using $cramer's$

rule: $2x - y = 10$, $4x + 3y = 10$.

8-Solve $2\sin^2\theta - 3\sin\theta - 2 = 0$,$where\ \theta \epsilon \left[0, \frac{3\pi}{2}\right]$.

9-Find the value of x which satisfies the equation: $\begin{vmatrix} x & 0 & 0 \\ 1 & x & x \\ 5 & 2 & x \end{vmatrix} = 3x$

10- Find the matrix A if : $A \times \begin{pmatrix} -2 & 2 \\ 4 & 3 \end{pmatrix} = \begin{pmatrix} 12 & 23 \\ 8 & 13 \end{pmatrix}$.

11- $\frac{\cos^2\theta - \sin^2\theta}{\sin\theta\cos^2\theta + \cos\theta\sin^2\theta} = \csc\theta - \sec\theta$.

12-If $A^t = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, prove that:$A^2 - 5A - 2I = 0$.

13-The length of an arc of a circular sector is $7cm$,and its perimeter

equals $25cm$.Find its area.

14-Solve graphically the s.s of:

$y - x > 0$, $2x + 2y \leq 12$, $y < 6 + 2x$

15- If $A = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 2 & -1 \\ -3 & 1 \end{pmatrix}$, then prove that:

$(AB)^{-1} = B^{-1}A^{-1}$.

16-ABC is a triangle in which $AB = AC$ and $BC = 20cm$ and $m(\hat{B}) = 48^0$

Find the length of $\overline{AB}$ to the nearest cm.

17-The area of a circular sector is 75 cm^2. and its perimeter is 35 cm , Find the measure of the central angle in rad. and degree.

18-Find the area of the minor circular segment in which the length of its chord is $24cm$ and its height is $6cm$.

19- The area of the equilateral triangle ABC is $36\sqrt{3}$ cm^2.then Find its side length.

20-Prove that: $\frac{\sin^3\theta + \cos^3\theta}{\sin\theta + \cos\theta} + \frac{\sin^3\theta - \cos^3\theta}{\sin\theta - \cos\theta} = 2$.

21-From the top of a rock of 50 m high , the measures of the two angles of depression of two sailboats are $32^0\ 10^\backslash$, $49^0\ 30^\backslash$ Find the distance between the two sailboats .

22-A man of height 1.5 m was standing on the ground at a point which is 10 m far from a flagpole .He found that the measure of the top of the flagpole is $40^0\ 22^\backslash$.Find the height of the flagpole to the nearest mete.

23-Solve the system of the following equations using cramer's rule: $3y+2x=z+1$, $3x+2z=8-5y$, $3z-1=x-2y$.

24-Find the area of a regular hexagon of side length 10 cm.

25-A bakery produced two kinds of cake.The first kind of cake needs $200\ gm$ of flour and $25\ gm$ of butter and the second kind of cake needs $100\ gm$ of flour and 50 gm of butter. If the quantity of given flour is 4 kg and the given butter is $1\frac{1}{4}$ kg .Find the greatest possible number of cakes that can be made.

26-A factory produces $120\ units$ at most of two different kinds of goods and achieves a profit in each unit of the first kind $L.E\ 15$ and of the second kind $L.E\ 8$ in each unit and the sold quantity of the second kind is not less than half the sold quantity of the first kind. Find the number of produced of each kind to satisfy the maximum profit.

27-Find the general solution of each of the following equations:

a)$\sin\theta=\frac{1}{2}$ b)$2\cos\theta-\sqrt{2}=0$ c)$\sqrt{3}\tan\theta-1=0$

Good Luck

(* Model answer of *) final revision

1)

a) $A = \frac{1}{2}\begin{vmatrix} 9 & 4 & 1 \\ 0 & 16 & 1 \\ 0 & 0 & 1 \end{vmatrix}$

$= \frac{1}{2}(9 \times 16 \times 1)$

$= \boxed{72}\ cm^2$

b) Per. $= 2r + \ell$

$12 = 2r + 4$

$\Rightarrow r = 4$

area $= \frac{1}{2}\ell r$

$= \frac{1}{2}(4)(4) = \boxed{8}\ cm^2$

c) $A^2 = \begin{pmatrix} 1 & 2 \\ 3 & -2 \end{pmatrix} \times \begin{pmatrix} 1 & 2 \\ 3 & -2 \end{pmatrix}$

$= \begin{pmatrix} 1+6 & 2-4 \\ 3-6 & 6+4 \end{pmatrix}$

$= \begin{pmatrix} 7 & -2 \\ -3 & 10 \end{pmatrix}$

$\Delta = \begin{vmatrix} 1 & 2 \\ 3 & -2 \end{vmatrix} = \boxed{-8}$

$A^{-1} = \frac{1}{\Delta}\begin{pmatrix} -2 & -2 \\ -3 & 1 \end{pmatrix}$

$= \frac{1}{-8}\begin{pmatrix} -2 & -2 \\ -3 & 1 \end{pmatrix}$

$= \begin{pmatrix} \frac{1}{4} & \frac{1}{4} \\ \frac{3}{8} & \frac{-1}{8} \end{pmatrix}$

d) $\theta + 3\theta = 90^\circ$

$\theta = \boxed{22.5}$

$m(\hat{C}) = 22.5$

$\cos C = \frac{BC}{AC}$

$\cos 22.5 = \frac{BC}{10}$

$BC = \boxed{9.239}$ cm

e) $\begin{pmatrix} 1 & x & 2 \\ -1 & 6 & 5 \end{pmatrix} = \begin{pmatrix} 1 & -3 & 2 \\ -1 & 6 & y \end{pmatrix}$

$\boxed{x = -3}$, $\boxed{y = 5}$

$xy = \boxed{-15}$

f) $A = \frac{1}{2}(AB)(BC)\sin B$

$= \frac{1}{2}(8)(11)\sin 60^\circ$

$= 44(\sqrt{3}/2) = \boxed{22\sqrt{3}}\ cm$

g) $\sin x = -\cos x$

$\frac{\sin x}{\cos x} = -1$

$\tan x = -1$

$x \in 2^{nd}, 4^{th}$

$180^\circ < x < 360^\circ$

$x \in 4^{th}$

$x = 360^\circ - 45^\circ = 315^\circ$

$S.S = \{315\}$

h) $= (2)(3)(5)$

$= \boxed{30}$

i) $A = \frac{1}{2} d_1 d_2 \sin\theta$

$= \frac{1}{2}(12)(8)\sin 30^\circ$

$= \boxed{24}\ \text{cm}^2$

j) $= \sin^2\theta + \cancel{2\sin\theta\cos\theta}$

$+ \cos^2\theta \cancel{- 2\sin\theta\cos\theta}$

$= \sin^2\theta + \cos^2\theta$

$= \boxed{1}$

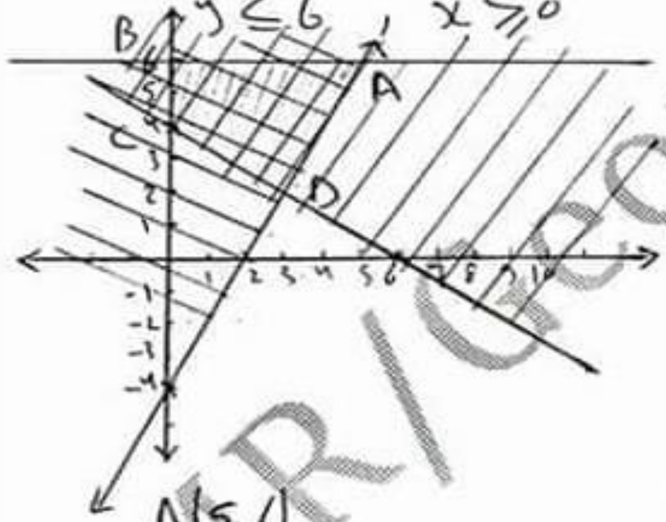
[2] $2x - y = 4$

x	0	2
y	−4	0

$2x + 3y = 12$

x	0	6
y	4	0

$y \le 6$, $x \ge 0$



A(5,6)
B(0,6)
C(0,4)
D(3,2)

$P_A = 3(5) + 2(6) = \boxed{27}$

$P_B = 3(0) + 2(6) = \boxed{12}$

$P_C = 3(0) + 2(4) = \boxed{8}$

$P_D = 3(3) + 2(2) = \boxed{13}$

8 is the min. value

[3] $A = \begin{pmatrix} 2 & 3 \\ 3 & 4 \end{pmatrix}$

$\Delta = \begin{vmatrix} 2 & 3 \\ 3 & 4 \end{vmatrix}$

$= 8 - 9 = \boxed{-1}$

$A^{-1} = \frac{1}{\Delta}\begin{pmatrix} 4 & -3 \\ -3 & 2 \end{pmatrix}$

$= \frac{1}{-1}\begin{pmatrix} 4 & -3 \\ -3 & 2 \end{pmatrix}$

$= \begin{pmatrix} -4 & 3 \\ 3 & -2 \end{pmatrix}$

$\begin{pmatrix} x \\ y \end{pmatrix} = A^{-1}\begin{pmatrix} 3 \\ 3 \end{pmatrix}$

$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -4 & 3 \\ 3 & -2 \end{pmatrix}\begin{pmatrix} 3 \\ 3 \end{pmatrix}$

$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -12 + 9 \\ 9 - 6 \end{pmatrix}$

$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -3 \\ 3 \end{pmatrix}$

$\boxed{x = -3}$, $\boxed{y = 3}$

[4] $\text{L.H.S} = \left(\frac{1}{\cos\theta} - \frac{\sin\theta}{\cos\theta}\right)^2$

$= \left(\frac{1 - \sin\theta}{\cos\theta}\right)^2$

$= \frac{(1 - \sin\theta)^2}{\cos^2\theta}$

$= \frac{(1 - \sin\theta)^2}{1 - \sin^2\theta}$

$= \frac{(1 - \sin\theta)^{\cancel{2}}}{\cancel{(1 - \sin\theta)}(1 + \sin\theta)}$

$= \frac{1 - \sin\theta}{1 + \sin\theta}$

$= \text{R.H.S}$

5)

$\sin\alpha = \frac{24}{25}$

$m(\angle\alpha) = 73°44'23''$

$m(\angle M) = 147°28'47''$

$A = \frac{1}{2}(r^2)[\theta^{rad} - \sin\theta]$

$= \frac{1}{2}(25)^2\{147°28'47'' \times \frac{\pi}{180°} - \sin 147°28'47''\}$

$\simeq \boxed{636.378}\ cm^2$

---

6) $AB = \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix} \times \begin{pmatrix} -1 & 0 \\ 2 & 4 \end{pmatrix}$

$= \begin{pmatrix} -3+2 & 0+4 \\ 0+4 & 0+8 \end{pmatrix}$

$= \begin{pmatrix} -1 & 4 \\ 4 & 8 \end{pmatrix}$

$(AB)^t = \begin{pmatrix} -1 & 4 \\ 4 & 8 \end{pmatrix} \rightarrow ①$

$B^t A^t = \begin{pmatrix} -1 & 2 \\ 0 & 4 \end{pmatrix} \times \begin{pmatrix} 3 & 0 \\ 1 & 2 \end{pmatrix}$

$= \begin{pmatrix} -3+2 & 0+4 \\ 0+4 & 0+8 \end{pmatrix}$

$= \begin{pmatrix} -1 & 4 \\ 4 & 8 \end{pmatrix} \rightarrow ②$

from ①, ②

$\therefore (AB)^t = B^t A^t$

#

7) $\Delta = \begin{vmatrix} 2 & -1 \\ 4 & 3 \end{vmatrix} = 6+4 = 10$

$\Delta x = \begin{vmatrix} 10 & -1 \\ 10 & 3 \end{vmatrix} = 30+10 = 40$

$\Delta y = \begin{vmatrix} 2 & 10 \\ 4 & 10 \end{vmatrix} = 20-40 = -20$

$S.S = \{(\frac{\Delta x}{\Delta}, \frac{\Delta y}{\Delta})\}$

$= \{(\frac{40}{10}, \frac{-20}{10})\}$

$= \{(4, -2)\}$

---

8) $(2\sin\theta + 1)(\sin\theta - 2) = 0$

$2\sin\theta = -1$ | $\sin\theta = 2$ ref.

$\sin\theta = \frac{-1}{2}$

$\theta \in 3^{rd}$, ~~4^{th}~~

$\theta \in [0, \frac{3\pi}{2}]$

$\theta = 180° + 30° = 210°$

---

9) $x\begin{vmatrix} x & x \\ 2 & x \end{vmatrix} = 3x$

$x(x^2 - 2x) = 3x$

$x^3 - 2x^2 = 3x$

$x^3 - 2x^2 - 3x = 0$

$x(x^2 - 2x - 3) = 0$

$x(x+1)(x-3) = 0$

$x = 0$, $x = -1$, $x = 3$

(10) $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \times \begin{pmatrix} -2 & 2 \\ 4 & 3 \end{pmatrix} = \begin{pmatrix} 12 & 23 \\ 8 & 13 \end{pmatrix}$

$\begin{pmatrix} -2a+4b & 2a+3b \\ -2c+4d & 2c+3d \end{pmatrix} = \begin{pmatrix} 12 & 23 \\ 8 & 13 \end{pmatrix}$

$-2a+4b=12 \quad \div 2$

$\boxed{-a+2b=6}$ —(1)

$\boxed{2a+3b=23}$ —(2)

$\boxed{-2a+4b=12}$ adding

$7b=35$

$\boxed{b=5}$

$-a+2(5)=6$

$\boxed{a=4}$

$\boxed{-2c+4d=8}$ —(1)

$\boxed{2c+3d=13}$ —(2)

$7d=21$

$\boxed{d=3}$

$-2c+4(3)=8$

$-2c=-4$

$\boxed{c=2}$

$A=\begin{pmatrix} 4 & 5 \\ 2 & 3 \end{pmatrix}$ #

(11) $L.H.S = \dfrac{(\cos\theta-\sin\theta)(\cos\theta+\sin\theta)}{\sin\theta\cos\theta(\cos\theta+\sin\theta)}$

$= \dfrac{\cos\theta}{\sin\theta\cos\theta} - \dfrac{\sin\theta}{\sin\theta\cos\theta}$

$= \dfrac{1}{\sin\theta} - \dfrac{1}{\cos\theta}$

$= \csc\theta - \sec\theta = R.H.S$

(12) $A^t = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \Rightarrow A = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$

$A^2 - 5A - 2I = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} - 5\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} - 2\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

$= \begin{pmatrix} 7 & 15 \\ 10 & 22 \end{pmatrix} + \begin{pmatrix} -5 & -15 \\ -10 & -20 \end{pmatrix} + \begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$

$= \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} = O$ #

(13) $Per. = 2r + \ell$

$25 = 2r + 7$

$18 = 2r \Rightarrow r = 9$ cm

$A = \frac{1}{2}\ell r = \frac{1}{2}(7)(9)$

$= \boxed{\frac{63}{2}}$ cm²

(14)

$y - x = 0$

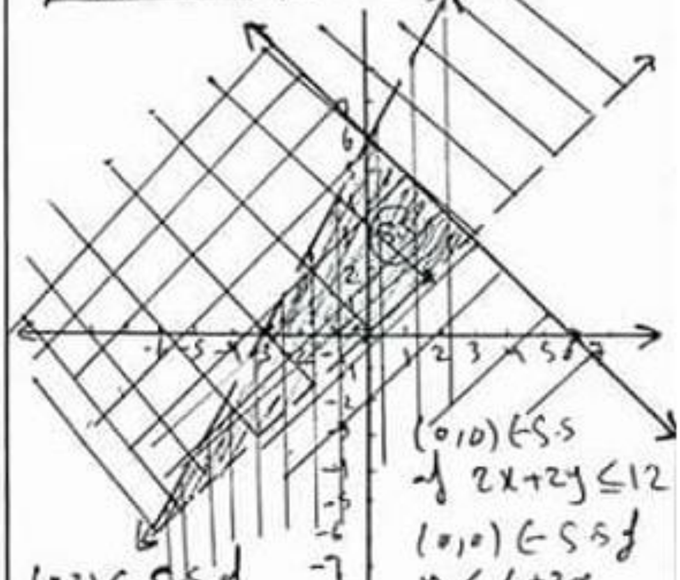
x	0	2
y	0	2

$2x + 2y = 12$

x	0	6
y	6	0

$y = 6 + 2x$

x	0	-3
y	6	0



$(0,0) \in S.S$ of $2x+2y \le 12$

$(0,0) \in S.S$ of $y < 6+2x$

$(0,2) \in S.S$ of $y - x > 0$

15) $AB = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} \times \begin{pmatrix} 2 & -1 \\ -3 & 1 \end{pmatrix}$

$= \begin{pmatrix} 2-9 & -1+3 \\ 4-12 & -2+4 \end{pmatrix}$

$= \begin{pmatrix} -7 & 2 \\ -8 & 2 \end{pmatrix}$

$(AB)^{-1} = \frac{1}{\Delta} \begin{pmatrix} 2 & -2 \\ 8 & -7 \end{pmatrix}$

$\Delta = \begin{vmatrix} -7 & 2 \\ -8 & 2 \end{vmatrix}$

$= -14 + 16 = 2$

$\Rightarrow (AB)^{-1} = \frac{1}{2} \begin{pmatrix} 2 & -2 \\ 8 & -7 \end{pmatrix}$

$= \boxed{\begin{pmatrix} 1 & -1 \\ 4 & -7/2 \end{pmatrix}} \to (1)$

$B^{-1} = \frac{1}{\Delta} \begin{pmatrix} 1 & 1 \\ 3 & 2 \end{pmatrix}$

$\Delta = \begin{vmatrix} 2 & -1 \\ -3 & 1 \end{vmatrix} = 2 - 3 = -1$

$B^{-1} = \frac{1}{-1} \begin{pmatrix} 1 & 1 \\ 3 & 2 \end{pmatrix} = \begin{pmatrix} -1 & -1 \\ -3 & -2 \end{pmatrix}$

$A^{-1} = \frac{1}{\Delta} \begin{pmatrix} 4 & -3 \\ -2 & 1 \end{pmatrix}$

$\Delta = \begin{vmatrix} 1 & 3 \\ 2 & 4 \end{vmatrix} = 4 - 6 = -2$

$A^{-1} = \frac{1}{-2} \begin{pmatrix} 4 & -3 \\ -2 & 1 \end{pmatrix}$

$= \begin{pmatrix} -2 & \frac{3}{2} \\ 1 & -\frac{1}{2} \end{pmatrix}$

$B^{-1}A^{-1} = \begin{pmatrix} -1 & -1 \\ -3 & -2 \end{pmatrix} \times \begin{pmatrix} -2 & \frac{3}{2} \\ 1 & -\frac{1}{2} \end{pmatrix}$

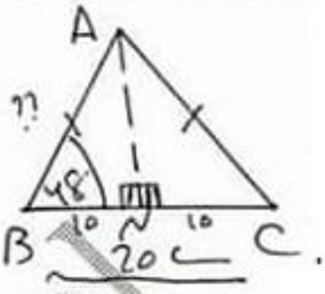
$= \begin{pmatrix} 2-1 & -\frac{3}{2}+\frac{1}{2} \\ 6-2 & -\frac{9}{2}+1 \end{pmatrix}$

$= \boxed{\begin{pmatrix} 1 & -1 \\ 4 & -7/2 \end{pmatrix}} \to (2)$

$\therefore$ From (1), (2)

$(AB)^{-1} = B^{-1}A^{-1}$

16)



In ΔABN

$\cos B = \frac{BN}{AB}$

$\cos 48° = \frac{10}{AB}$

$AB = \frac{10}{\cos 48°} = 15\ cm$

17)

$A = \frac{1}{2} \ell r$

$75 = \frac{1}{2} \ell r$

$\boxed{150 = \ell r} \to (1)$

$P = 2r + \ell$

$35 = 2r + \ell$

$\boxed{\ell = 35 - 2r} \to (2)$

from (2) in (1)

$r(35 - 2r) = 150$

$35r - 2r^2 = 150$

$2r^2 - 35r + 150 = 0$

$(2r - 15)(r - 10) = 0$

$r = \frac{15}{2}\ cm$

$\ell = 35 - 2\left(\frac{15}{2}\right)$

$= 20\ cm$

$\theta^{rad} = \frac{\ell}{r}$

$= \frac{20}{15/2}$

$= \frac{8}{3}$ #

$r = 10\ cm$

$\ell = 35 - 2(10)$

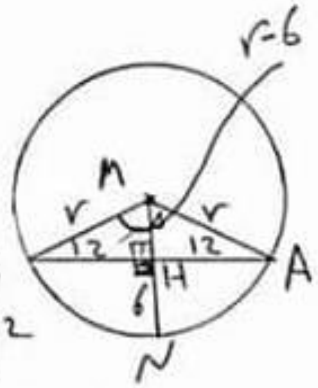
$= 15\ cm$

$\theta^{rad} = \frac{\ell}{r}$

$= \frac{15}{10}$

$= \frac{3}{2}$ #

18



$MN = r - 6$

In $\triangle MHB$

$(MB)^2 = (MH)^2 + (HB)^2$

$r^2 = (r-6)^2 + (12)^2$

$\cancel{r^2} = \cancel{r^2} - 12r + 36 + 144$

$12r = 180 \Rightarrow \boxed{r = 15}$ cm

$\therefore r = 15$ cm , $MH = 15 - 6 = \boxed{9}$ cm

$\sin(B\hat{M}H) = \frac{12}{15}$

$m(B\hat{M}H) = 53^\circ 7' 48''$

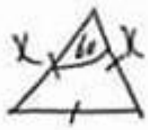
$m(\hat{M}) = 106^\circ 15' 37''$

$A = \frac{1}{2} r^2 (\theta^{rad} - \sin\theta^\circ)$

$= \frac{1}{2}(15)^2 \left[106^\circ 15' 37'' \times \frac{\pi}{180} - \sin 106^\circ 15' 37''\right]$

$\simeq \boxed{100.642}$ cm²

19



$A = \frac{1}{2}(x)(x)\sin 60^\circ$

$36\sqrt{3} = \frac{1}{2}x^2\left(\frac{\sqrt{3}}{2}\right)$

$36\sqrt{3} = \frac{\sqrt{3}}{4}x^2$

$x^2 = 144$

$x = \boxed{12}$ cm

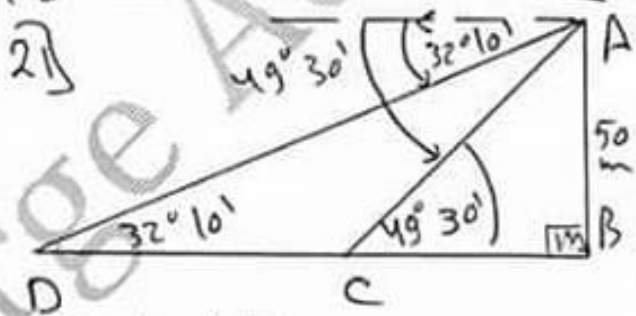
20

$$L.H.S = \frac{\cancel{(\sin\theta + \cos\theta)}(\sin^2\theta - \sin\theta\cos\theta + \cos^2\theta)}{\cancel{(\sin\theta + \cos\theta)}} + \frac{\cancel{(\sin\theta - \cos\theta)}(\sin^2\theta + \sin\theta\cos\theta + \cos^2\theta)}{\cancel{(\sin\theta - \cos\theta)}}$$

$= \sin^2\theta - \cancel{\sin\theta\cos\theta} + \cos^2\theta + \sin^2\theta + \cancel{\sin\theta\cos\theta} + \cos^2\theta$

$= 1 + 1 = \boxed{2}$

21



In $\triangle ABC$

$\tan 49^\circ 30' = \frac{50}{BC}$

$BC = \frac{50}{\tan 49^\circ 30'}$

$\simeq 42.7$ m

In $\triangle ABD$

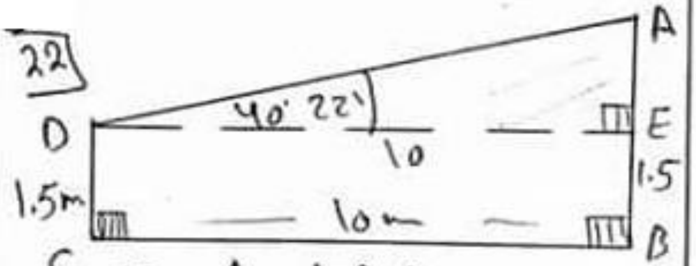
$\tan 32^\circ 10' = \frac{50}{BD}$

$BD = \frac{50}{\tan 32^\circ 10'}$

$\simeq 79.5$ m

$CD \simeq 36.796$ m

22



In Δ AED

$\tan 40° 22' = \frac{AE}{10}$

$AE = 10 \times \tan 40° 22'$

$= 8.5 m$

$AB = 8.5 + 1.5 = 10 m$

23

$2x + 3y - z = 1 \rightarrow ①$

$3x + 5y + 2z = 8 \rightarrow ②$

$-x + 2y + 3z = 1 \rightarrow ③$

$\Delta = \begin{vmatrix} 2 & 3 & -1 \\ 3 & 5 & 2 \\ -1 & 2 & 3 \end{vmatrix}$

$= 2\begin{vmatrix} 5 & 2 \\ 2 & 3 \end{vmatrix} - 3\begin{vmatrix} 3 & 2 \\ -1 & 3 \end{vmatrix} - \begin{vmatrix} 3 & 5 \\ -1 & 2 \end{vmatrix}$

$= 2(15-4) - 3(9+2) - (6+5)$

$= 22 - 33 - 11 = -22$

$\Delta x = \begin{vmatrix} 1 & 3 & -1 \\ 8 & 5 & 2 \\ 1 & 2 & 3 \end{vmatrix}$

$= \begin{vmatrix} 5 & 2 \\ 2 & 3 \end{vmatrix} - 3\begin{vmatrix} 8 & 2 \\ 1 & 3 \end{vmatrix} - \begin{vmatrix} 8 & 5 \\ 1 & 2 \end{vmatrix}$

$= (15-4) - 3(24-2) - (16-5)$

$= 11 - 66 - 11$

$= -66$

$\Delta y = \begin{vmatrix} 2 & 1 & -1 \\ 3 & 8 & 2 \\ -1 & 1 & 3 \end{vmatrix}$

$= 2\begin{vmatrix} 8 & 2 \\ 1 & 3 \end{vmatrix} - \begin{vmatrix} 3 & 2 \\ -1 & 3 \end{vmatrix} - \begin{vmatrix} 3 & 8 \\ -1 & 1 \end{vmatrix}$

$= 2(24-2) - (9+2) - (3+8)$

$= 44 - 11 - 11$

$= 22$

$\Delta z = \begin{vmatrix} 2 & 3 & 1 \\ 3 & 5 & 8 \\ -1 & 2 & 1 \end{vmatrix}$

$= 2\begin{vmatrix} 5 & 8 \\ 2 & 1 \end{vmatrix} - 3\begin{vmatrix} 3 & 8 \\ -1 & 1 \end{vmatrix} + \begin{vmatrix} 3 & 5 \\ -1 & 2 \end{vmatrix}$

$= 2(5-16) - 3(3+8) + (6+5)$

$= -22 - 33 + 11$

$= \boxed{-44}$

$x = \frac{\Delta x}{\Delta} = \frac{-66}{-22} = 3$

$y = \frac{\Delta y}{\Delta} = \frac{22}{-22} = -1$

$z = \frac{\Delta z}{\Delta} = \frac{-44}{-22} = 2$

$S.S = \{(3, -1, 2)\}$

24

$A = \frac{1}{4} n x^2 \cot \frac{\pi}{n}$

$= \frac{1}{4}(6)(10)^2 \cot \frac{180}{6}$

$= \frac{1}{4} \times 6 \times 100 \times \frac{1}{\tan 30°}$

$\simeq \boxed{259.8}\ cm^2$

25)

	A (x)	B (y)	given
flour	200	100	4000
butter	25	50	1250

$x \geq 0 \quad , y \geq 0$

$200x + 100y \leq 4000 \quad (\div 100)$

$\boxed{2x + y \leq 40} \to ①$

$25x + 50y \leq 1250 \quad (\div 25)$

$\boxed{x + 2y \leq 50} \to ②$

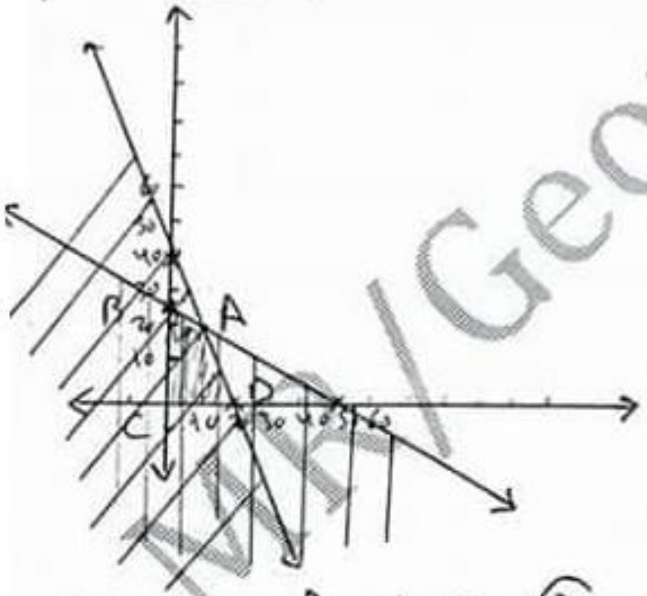
$\boxed{P = x + y}$

$2x + y = 40$

x	0	20
y	40	0

$x + 2y = 50$

x	0	50
y	25	0



$A(10, 20) \Rightarrow P_A = 10 + 20 = 30$

$B(0, 25) \Rightarrow P_B = 0 + 25 = 25$

$C(0, 0) \Rightarrow P_C = 0 + 0 = 0$

$D = (20, 0) \Rightarrow P_D = 20 + 0 = 20$

greatest number $= 30$ cakes

26)

$x \geq 0$
$y \geq 0$

$\boxed{x + y \leq 120} \to ①$

$\boxed{P = 15x + 8y}$

$y \geq \frac{1}{2}x$

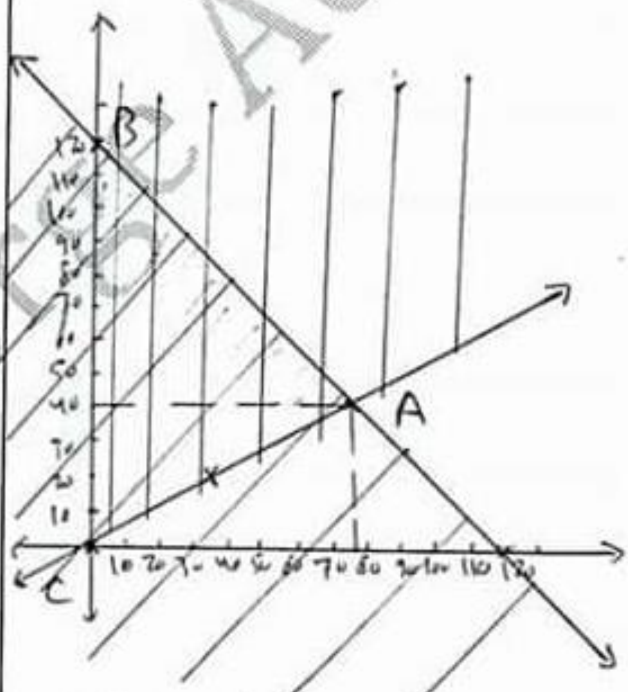
$\boxed{2y \geq x} \to ②$

$x + y = 120$

x	0	120
y	120	0

$2y = x$

x	0	40
y	0	20



$A(80, 40) \Rightarrow P_A =$

$B(0, 120) \Rightarrow P_B =$

$C(0, 0) \Rightarrow P_C =$

Good luck

Mr/George adel

Sec 1 _ Geometric Rules _ T2

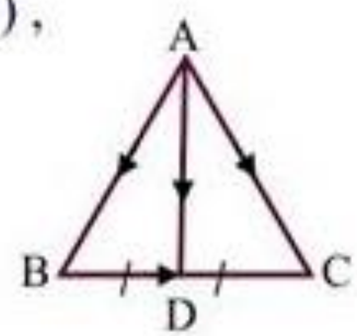
(1) The norm of the vector $\overrightarrow{A}$ (x, y): $\| A \| = \sqrt{x^2 + y^2}$

(2) The polar form from the position vector: $(\| A \|, \theta^{\circ})$, $\tan \theta = \frac{y}{x}$, $x = \| A \| \cos \theta$, $y = \|A\| \sin \theta$

(3) The vector $\overrightarrow{A}$ in fundamental form $A = x \overrightarrow{i} + y \overrightarrow{j}$

(4) If : $\overrightarrow{A} = (x_1, y_1)$, $\overrightarrow{B} = (x_2, y_2)$, then :

- $\overrightarrow{A} + \overrightarrow{B} = (x_1 + x_2 +, y_1 + y_2)$
- $\overrightarrow{A} \parallel \overrightarrow{B} \supset x_1 \times y_2 - x_2 \times y_1 = 0$, **or** $m_1 = m_2$ (m slope)
- $\overrightarrow{A} \perp \overrightarrow{B} \supset x_1 \times x_2 + y_1 \times y_2 = 0$, or $m_1 \times m_2 = -1$
- $\overrightarrow{AB} = B - A = (x_2 - x_1, y_2 - y_1)$,

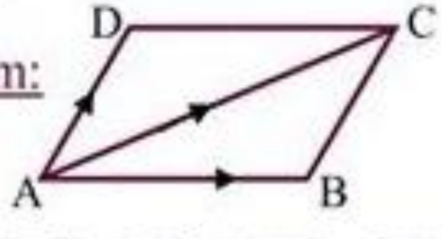


(5) In any triangle ABC :

$\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}$, $\overrightarrow{AB} = -\overrightarrow{BA}$

$\overrightarrow{AB} + \overrightarrow{AC} = 2\overrightarrow{AD}$

In a parallelogram:



$\overrightarrow{AB} + \overrightarrow{AD} = \overrightarrow{AC}$

In Quadrilateral: $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CD} + \overrightarrow{DA} = 0$

(6) Physical application :

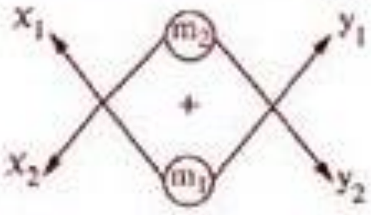
- The resultant force ($\overrightarrow{F}$) = $\overrightarrow{F_1} + \overrightarrow{F_2} + \overrightarrow{F_3} + \dots\dots\dots$

  If $\overrightarrow{F} = 0$, the system is equilibrium

- The relative velocity $\overrightarrow{V_{AB}} = \overrightarrow{V_B} - \overrightarrow{V_A}$

(7) Division of a line segment:

A = (x_1 , y_1) , B = (x_2 , y_2), C (x , y) divide $\overline{AB}$ by ratio $\frac{m_2}{m_1}$



- Internally:

C (x , y) = $\left(\frac{m_1 x_1 + m_2 x_2}{m_1 + m_2} , \frac{m_1 y_1 + m_2 y_2}{m_1 + m_2} \right)$

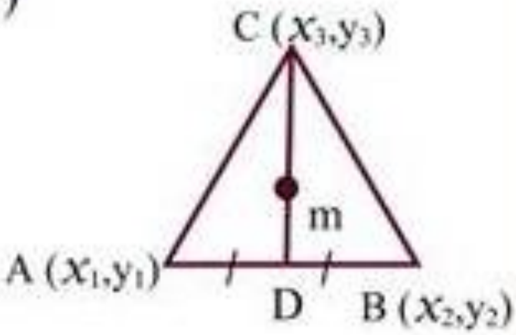
- Externally:

C (x , y) = $\left(\frac{m_1 x_1 - m_2 x_2}{m_1 - m_2} , \frac{m_1 y_1 - m_2 y_2}{m_1 - m_2} \right)$

- Midpoint:

D (x , y) = $\left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$

- Point of concurrence:



m (x , y) = $\left(\frac{x_1 + x_2 + x_3}{3} , \frac{y_1 + y_2 + y_3}{3} \right)$

(8) To prove that the three points A , B , C are collinear using vectors, Prove that $\overrightarrow{AB} = K\,\overrightarrow{AC}$

(9) To prove the quadrilateral ABCD is a parallelogram we prove that : $\overrightarrow{AB} = \overrightarrow{DC}$ or $\overrightarrow{AD} = \overrightarrow{BC}$

(10) To prove that the parallelogram is **rectangle**:

We prove that: $\overrightarrow{AB} \perp \overrightarrow{BC}$ or $\| \overrightarrow{AC} \| = \| \overrightarrow{BD} \|$

(11) To prove that the parallelogram is **rhombus**:

We prove that: $\| \overrightarrow{AB} \| = \| \overrightarrow{BC} \|$ or $\overrightarrow{AC} \perp \overrightarrow{BD}$

(12) The equations of straight line:

If : $\overrightarrow{A} = (x_1, y_1)$, Vector $\overrightarrow{u} = (a, b)$ then :

- The vector equation: $\vec{r} = \overrightarrow{A} + k\,\overrightarrow{u} = (x_1, y_1) + k\,(a, b)$

$$m \text{ (slope)} = \frac{b}{a}$$

- The two parametric equations are :

$$X = x_1 + k\,a \quad , \quad Y = y_1 + k\,b$$

- Cartesian equation: $\frac{Y - y_1}{X - x_1} = m$, $m = \frac{y_2 - y_1}{x_2 - x_1} = \tan\theta$

- In terms of the slope (m) and the intercept c

$$y = m\,x + c$$

- In terms of the two intercepts a , b from the x–axis and the y–axis respectively: $\frac{x}{a} + \frac{y}{b} = 1$

- General equation of the straight line:

$$a_1\,x + b_1\,y + c_1 + k\,(a_2\,x + b_2\,y + c_2) = 0$$

(13) Measure of angel between two straight lines :

$\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1 m_2}\right|, \theta \in [0, \frac{\pi}{2}[$, $m_1 = \tan\theta_1$, $m_2 = \tan\theta_2$

(14) The length of the perpendicular from a point to a straight line

Point (x_1, y_1), equation of St. line $ax + by + c = 0$

$$L = \frac{|a x_1 + b y_1 + c|}{\sqrt{a^2 + b^2}}$$

Important Notice

- The slope of straight line parallel to X –axis = Zero
- The slope of straight line parallel to Y –axis is undefined
- $L_1 \parallel L_2$ ⟹ $m_1 = m_2$
- $L_1 \perp L_2$ ⟹ $m_1 \times m_2 = -1$
- If slope of $\overrightarrow{AB}$ = slope of $\overrightarrow{AC}$, then A , B , C are collinear
- If the straight line parallel to X-axis :
  - Vector $\vec{u} = (1, 0)$, Cartesian equation is $Y = y_1$
- If the straight line parallel to Y-axis :
  - Vector $\vec{u} = (0, 1)$, Cartesian equation is $X = x_1$
- The Cartesian equation of straight line passing through origin point (0,0) is $Y = m X$, m (slope)

1-Complete:

a)If $A = (3,5)$, $B = (-1,m)$, $\|\overrightarrow{AB}\| = 4$, then the value of $m = \cdots$

b)The length of the perpendicular drawn from the point$(1,1)$ to the straight line whose eq. is $x + y = 0$ equals…….length unit

c)If $\overrightarrow{AB} = \overrightarrow{CD}$ where $\overrightarrow{AB} = (6,4)$, $\vec{C} = (-1,3)$, then $\vec{D} = \cdots$

d)The vector equation of the st. line which passes through the point$(3,5)$ parallel to $x - axis$ is ……..

e)If C divides $\overrightarrow{AB}$ externally by the ratio $2:1$, then the coord.of the point B are…. where $C(-8,-10)$, $A(6,8)$.

f)The measure of the acute angle between the two st. lines whose slopes are $\frac{5}{6}$, $\frac{-1}{11}$ equals……….

g)If$\overrightarrow{AB} = (-2,6), \overrightarrow{CD} = (4,3k)$, $\overrightarrow{AB} // \overrightarrow{CD}$ then $k = \cdots$

h)If $\vec{A} = (8,120^0)$ then the coordinates of the point $A = \cdots$

i)If $A = (2,4)$ then the polar form of $\vec{A}$ is………..

j)The Cartesian equation of the st. line which passes through the point$(3,-4)$ and the direction vector of it is $(2,-1)$ is……..

k)The direction vector of the st. line :$3x - 4y + 7 = 0$ is……

l)The equation of the st. line passing through the two points $(2,3)$ and $(3,5)$ is … … … ….

2-If $A=(1,4), B=(-4,9)$, find the equation of the st.line which passes through the point of dividing $\overrightarrow{AB}$ internally by the ratio $2:3$ and perpendicular to the st. line whose equation $5x-4y-12=0$.

3-Find the distance between the point $(1,5)$ and the st.line joining the two points $(5,-3)$, $(1,0)$.

4-If A, B, C are three collinear points where $A=(2,5)$, $B=(5,2)$,$C=(4,y)$.Find the ratio by which the point C divides the directed segment $\overrightarrow{AB}$ showing the type of divesion.

5-Find the different forms of the equations of the st. line which passes through the point $(3,5)$ and perpendicular to the str. line:$3x-2y+7=0$.

6-If $\vec{a}=3\hat{i}-4\hat{j}$, $\hat{b}=12\hat{i}+4k\hat{j}$, then find the value of k if:

i)$\vec{a}//\vec{b}$ ii) $\vec{a}\perp\vec{b}$

7-$ABCD$ is a quadrilaterl in which : $\overrightarrow{BC}=2\overrightarrow{AD}$

Prove that: $\overrightarrow{AC}+\overrightarrow{BD}=3\overrightarrow{AD}$

8-Find the different forms of the equations of the st. line which passes through the point $(3,2)$. and makes with the positive direction of $x-axis$ an angle of tangent $\frac{3}{4}$.

9-$ABCD$ is a quadrilateral If E, F are the mid points of $\overline{AB}, \overline{CD}$

prove that: $\overrightarrow{AD} + \overrightarrow{BC} = 2\overrightarrow{EF}$.

10-$ABCD$ is a parallelogram , $A(2,-1), B(7,1), C(4,4)$.Find D.

11-Find the point C which divides $\overline{AB}$ externally at the ratio

5: 2 where $A(5,-2), B(3,4)$.

12-Find the measure of the angle between the two st. lines

$L_1: X + 2y + 5 = 0$, $L_2: \vec{r} = (2,-3) + k(2,-3)$

13-Find the value of k if the measure of the angle between

the two st. lines $x + ky - 8 = 0$ and $2x - y + 5 = 0$ equals

$\frac{\pi}{4}$. Find k.

14-If the length of the perpendicular drawn from the point

$(7, c)$ to the st. line $6x - 8y + 7 = 0$ equals 3.5 $unit$

length. Find c.

15-Prove that the two st. lines :

$L_1: -3X + 2y + 5 = 0$, $L_2: \vec{r} = (2,-3) + k(2,-3)$

are parallel and find the distance between them.

16-If $\|-8\vec{A}\| = 5\|k\vec{A}\|$, then find the value of k.

17-Find the equation of the st. line which passes through the point of intersection of the two st. lines $2x + y = 5$, $\vec{r} = (1,0) + t(1,1)$ and passes through the point $(5,3)$.

18-Prove that the triangle whose vertices are the points $Y = (4,2), X(3,5), Z(-5,-1)$ is a right-angled triangle at Y ,then calculate the area of the circle which passes through its vertices.

19-Find the ratio by which $X-axis$ divides $\overrightarrow{AB}$, where , $A = (-3,4)$, $B = (6,-8)$.

20-$\overline{AB}$ is a diameter of circle M , if $B(-7,11), M(-2,3)$, Find the equation of the tangent to the circle at the point A.

21-A circle of centre the origin point , prove that the two chords drawn in the circle and whose equations are $3x + 4y + 10 = 0$, $5x - 12y + 26 = 0$ are equal in length.

22-$ABCD$ is a trapezium in which $\overline{AD}//\overline{BC}$, $A = (7,-1)$ $B = (3,-1), C = (2,1), D = (5,y)$:

i)Find the value of y.

ii)Find the area of the trapezium $ABCD$.

Model answer

1) a) $\overrightarrow{AB} = \vec{B} - \vec{A}$

$= (-1, m) - (3, 5)$

$= (-4, m-5)$

$\|\overrightarrow{AB}\| = 4$

$\sqrt{(-4)^2 + (m-5)^2} = 4$ (sq.)

$16 + (m-5)^2 = 16$

$(m-5)^2 = 0$

$m - 5 = 0$

$\boxed{m = 5}$

b) $h = \dfrac{|1 + 1|}{\sqrt{(1)^2 + (1)^2}}$

$= \dfrac{2}{\sqrt{2}} = \sqrt{2}$ unit length

(1,1), h, $x + y = 0$

c) $\overrightarrow{AB} = \overrightarrow{CD}$

$(6,4) = \vec{D} - \vec{C}$

$\vec{D} = (6,4) + \vec{C}$

$= (6,4) + (-1,3)$

$= \boxed{(5,7)}$

d) $\parallel$ x-axis $\Rightarrow m = 0$

$\vec{u} = (1, 0)$

$\vec{r} = (3,5) + k(1,0)$

$(x, y) = (3,5) + k(1,0)$

e) A (6,8) $\vec{r}_1$, B (x,y) $\vec{r}_2$, C (−8,−10) $\vec{r}$; AC : BC = m_2 : m_1 = 2 : 1

$\vec{r} = \dfrac{m_2 \vec{r}_2 - m_1 \vec{r}_1}{m_2 - m_1}$

$(-8, -10) = \dfrac{2(x,y) - 1(6,8)}{2 - 1}$

$(-8, -10) = (2x - 6, 2y - 8)$

$2x - 6 = -8$ | $2y - 8 = -10$

$2x = -2$ | $2y = -2$

$\boxed{x = -1}$ | $\boxed{y = -1}$

$\boxed{B(-1, -1)}$

f) $\tan\theta = \left|\dfrac{m_1 - m_2}{1 + m_1 m_2}\right|$

$= \left|\dfrac{5/6 + 1/11}{1 + (5/6)(-1/11)}\right|$

$= 1$

$\Rightarrow m(\theta) = 45°$

g) $\dfrac{x_1}{x_2} = \dfrac{y_1}{y_2}$

$\dfrac{-2}{4} = \dfrac{6}{3k}$

$\boxed{k = -4}$

h) $\vec{A} = (\|\vec{A}\| \cos\theta, \|\vec{A}\| \sin\theta)$

$= (8 \cos 120°, 8 \sin 120°)$

$= (-4, 4\sqrt{3})$

i) $\|\vec{A}\| = \sqrt{(2)^2 + (4)^2}$

$= \sqrt{4 + 16}$

$= \boxed{2\sqrt{5}}$

$\tan\theta = \frac{y}{x} = \frac{4}{2} = 2$

$\theta = 63^\circ\ 26'\ 7''$

$\vec{A} = (2\sqrt{5}, 63^\circ\ 26'\ 7'')$

j) $\vec{r} = \vec{A} + k\vec{u}$

$(x,y) = (3,-4) + k(2,-1)$

$x = 3 + 2k$

$y = -4 - k$

$\frac{y+4}{x-3} = \frac{-1}{2}$

$2y + 8 = -x + 3$

$\boxed{x + 2y + 5 = 0}$

k) $m = \frac{-3}{-4} = \frac{3}{4}$

$\vec{u} = (4,3)$

l) $m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{5-3}{3-2} = \frac{2}{1}$

$\vec{u} = (1,2)$

$\vec{r} = (2,3) + k(1,2)$

$x = 2 + k$

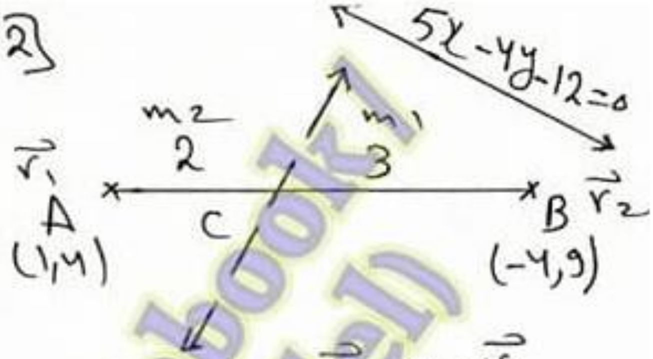
$y = 3 + 2k$

$\frac{y-3}{x-2} = \frac{2}{1}$

$2x - 4 = y - 3$

$2x - y - 1 = 0$ ≠

2]



$\vec{r} = \frac{m_2\vec{r}_2 + m_1\vec{r}_1}{m_2 + m_1}$

$(x,y) = \frac{2(-4,9) + 3(1,4)}{5}$

$(x,y) = (-1,6)$ Point C

$m_1 = \frac{-5}{-4} = \frac{5}{4}$

$m_2 = \frac{-4}{5} \Rightarrow \vec{u} = (5,-4)$

$\vec{r} = (-1,6) + k(5,-4)$

$x = -1 + 5k$

$y = 6 - 4k$

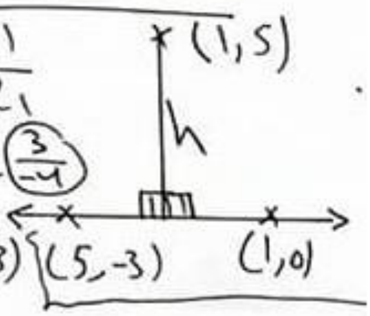
$\frac{y-6}{x+1} = \frac{-4}{5}$

$5y - 30 = -4x - 4$

$\boxed{4x + 5y - 26 = 0}$

3] $m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{0+3}{1-5} = \frac{3}{-4}$



$\vec{r} = (1,0) + k(-4,3)$

$x = 1 - 4k$

$y = 0 + 3k$

$\frac{y}{x-1} = \frac{3}{-4}$

$3x - 3 = -4y$

$3x + 4y - 3 = 0$

$$h = \frac{|3(1)+4(5)-3|}{\sqrt{(3)^2+(4)^2}}$$

$$= \frac{|20|}{5} = \boxed{4} \text{ unit length}$$

4] $\vec{r_1}$ $\vec{r}$ $\vec{r_2}$

(2,5) (4,y) (5,2)

A m_2 C m_1 B

$$(4,y) = \frac{m_2 \vec{r_2} + m_1 \vec{r_1}}{m_2 + m_1}$$

$$(4,y) = \frac{m_2(5,2) + m_1(2,5)}{m_2 + m_1}$$

$$(4,y) = \left(\frac{5m_2 + 2m_1}{m_2 + m_1}, \frac{2m_2 + 5m_1}{m_2 + m_1}\right)$$

$$4 = \frac{5m_2 + 2m_1}{m_2 + m_1}$$

$$4m_2 + 4m_1 = 5m_2 + 2m_1$$

$$\boxed{2m_1 = m_2}$$

$$\frac{m_2}{m_1} = \frac{2}{1}$$

internally at ratio 2:1

5] $$m_1 = \frac{-3}{-2} = \frac{3}{2}$$

$$m_2 = \frac{-2}{3}$$

$$\vec{u} = (3,-2)$$

$$\vec{r} = (3,5) + k(3,-2)$$

$$x = 3 + 3k$$

$$y = 5 - 2k$$

$$\frac{y-5}{x-3} = \frac{-2}{3}$$

$$3y - 15 = -2x + 6$$

$$\boxed{2x + 3y - 21 = 0}$$

6] $\vec{a} = (3,-4)$, $\vec{b} = (12, 4k)$

$\vec{a} \parallel \vec{b}$

$$\frac{3}{12} = \frac{-4}{4k}$$

$$\boxed{k = -4}$$

$\vec{a} \perp \vec{b}$: $(3)(12) + (-4)(4k) = 0$

$$16k = 36$$

$$\boxed{k = \frac{9}{4}}$$

7] 

$$L.H.S = \vec{AC} + \vec{BD}$$

$$= \cancel{\vec{AB}} + \vec{BC} + \cancel{\vec{BA}} + \vec{AD}$$

$$= \vec{BC} + \vec{AD}$$

$$= 2\vec{AD} + \vec{AD}$$

$$= 3\vec{AD} = R.H.S$$

8] $$m = \tan\theta$$

$$= \frac{3}{4}$$

$$\vec{u} = (4,3)$$

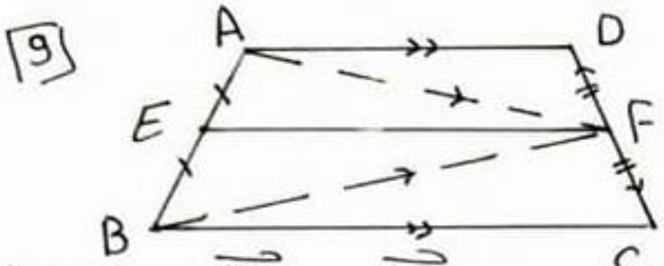
$$(x,y) = (3,2) + k(4,3)$$

$$\frac{y-2}{x-3} = \frac{3}{4}$$

$$3x - 9 = 4y - 8$$

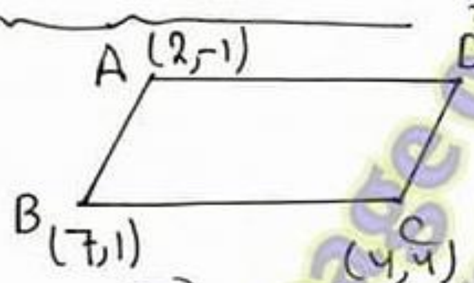
$$\boxed{3x - 4y - 1 = 0}$$

9



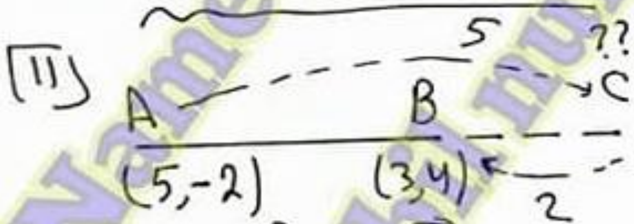
$$L.H.S = \overrightarrow{AD} + \overrightarrow{BC}$$
$$= \overrightarrow{AF} + \cancel{\overrightarrow{FD}} + \overrightarrow{BF} + \cancel{\overrightarrow{FC}}$$
$$= \overrightarrow{AF} + \overrightarrow{BF}$$
$$= 2\,\overrightarrow{EF} = R.H.S$$

10



$$\overrightarrow{AD} = \overrightarrow{BC}$$
$$\vec{D} - \vec{A} = \vec{C} - \vec{B}$$
$$\vec{D} = \vec{C} - \vec{B} + \vec{A}$$
$$= (4,4) - (7,1) + (2,-1)$$
$$= (-1, 2)$$

11



$$\vec{r} = \frac{m_2\vec{r_2} - m_1\vec{r_1}}{m_2 - m_1}$$
$$= \frac{5(3,4) - 2(5,-2)}{5-2}$$
$$= \frac{(5, 24)}{3}$$
$$= (5/3, 8)$$

12 $m_1 = \frac{-1}{2}$, $m_2 = \frac{-3}{2}$

$$\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1 m_2}\right|$$
$$= \left|\frac{-1/2 + 3/2}{1 + (-1/2)(-3/2)}\right|$$
$$= \left|\frac{4}{7}\right|$$
$$m(\hat{\theta}) = 29^\circ\ 44'\ 42''$$

13 $m_1 = \frac{-1}{k}$, $m_2 = \frac{-2}{-1} = 2$

$$\tan 45^\circ = \left|\frac{-1/k - 2}{1 + (-1/k)(2)}\right|$$
$$1 = \left|\frac{-1/k - 2}{1 - 2/k}\right| \frac{\times k}{\times k}$$
$$1 = \left|\frac{-1 - 2k}{k - 2}\right|$$

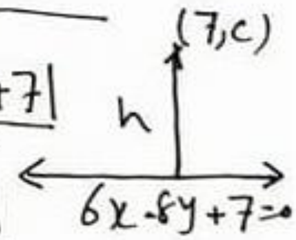
$\frac{-1-2k}{k-2} = 1$ | $\frac{-1-2k}{k-2} = -1$

$-1-2k = k-2$ | $-1-2k = -k+2$

$1 = 3k$ | $\boxed{-3 = k}$

$\boxed{k = \frac{1}{3}}$

14



$$h = \frac{|6(7) - 8(c) + 7|}{\sqrt{36+64}}$$
$$3.5 = \frac{|49 - 8c|}{10}$$
$$35 = |49 - 8c|$$

$49 - 8c = 35$ | $49 - 8c = -35$

$c = \boxed{\frac{7}{4}}$ | $c = \boxed{\frac{21}{2}}$

15

$L_1 : 3x+2y+5=0$

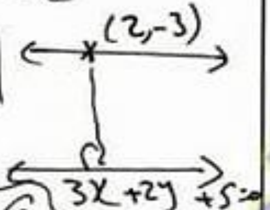
$m_1 = \frac{-3}{2}$

$L_2 \quad \vec{r} = (2,-3)+k(2,-3)$

$m_2 = \frac{-3}{2}$

$m_1 = m_2$

$\Rightarrow L_1 \parallel L_2$



$h = \frac{|3(2)+2(-3)+5|}{\sqrt{9+4}}$

$= \frac{|5|}{\sqrt{13}} = \frac{5\sqrt{13}}{13}$

16

$|-8|\,\|\vec{A}\| = 5|k|\,\|\vec{A}\|$

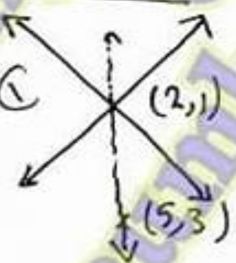
$8 = 5|k|$

$|k| = \frac{8}{5}$

$\boxed{k = \pm\frac{8}{5}}$

17

$\boxed{2x+y=5} \to (1)$



$(x,y) = (1,0)+t(1,1)$

$x = 1+t$

$y = 0+t$

$\frac{y}{x-1} = \frac{1}{1}$

$y = x-1$

$\boxed{x-y=1} \to (2)$

by adding

$3x = 6 \Rightarrow \boxed{x=2}$

$2-y=1 \Rightarrow \boxed{y=1}$

Point of intersection $(2,1)$

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{1-3}{2-5}$

$= \frac{-2}{-3} = \frac{2}{3}$

$\vec{u} = (3,2)$

$\vec{r} = (5,3)+k(3,2)$

$x = 5+3k$

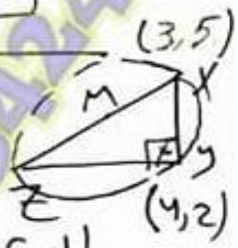
$y = 3+2k$

$\frac{y-3}{x-5} = \frac{2}{3}$

$2x-10 = 3y-9$

$\boxed{2x-3y-1=0}$

18



$m_1(\overleftrightarrow{XY}) = \frac{2-5}{4-3}$

$= \frac{-3}{1}$

$= -3$

$m_2(\overleftrightarrow{YZ}) = \frac{-1-2}{-5-4} = \frac{-3}{-9}$

$= \frac{1}{3}$

$m_1 m_2 = -1$

$\overline{XY} \perp \overline{YZ}$

$XZ = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$= \sqrt{(3+5)^2+(5+1)^2}$

$= 10$ unit length

$r = 5$ .. ..

$A = \pi r^2$

$= \pi(5)^2$

$= 25\pi$ sq. unit

19

$(-3,4)\quad (x,0)\quad (6,-8)$

$A \quad m_2 \quad m_1 \quad B$

$$(x,0) = \frac{m_2(6,-8)+m_1(-3,4)}{m_2+m_1}$$

$$(x,0) = \frac{(6m_2-3m_1,\,-8m_2+4m_1)}{m_2+m_1}$$

$$(x,0) = \left(\frac{6m_2-3m_1}{m_2+m_1},\ \frac{-8m_2+4m_1}{m_2+m_1}\right)$$

$$0 = \frac{-8m_2+4m_1}{m_2+m_1}$$

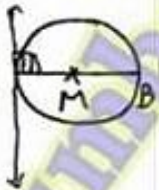
$$-8m_2+4m_1=0$$

$$4m_1 = 8m_2$$

$$\frac{m_2}{m_1} = \frac{4}{8} = \frac{1}{2}$$

Internally at ratio $1:2$

20 $m_1(\overleftrightarrow{AB}) = \dfrac{3-11}{-2+7} = \dfrac{-8}{5}$



$m_2 = \boxed{\dfrac{5}{8}}$

$$(-2,3) = \left(\frac{-7+x}{2},\ \frac{11+y}{2}\right)$$

$\dfrac{-7+x}{2} = -2$ | $\dfrac{11+y}{2} = 3$

$-7+x = -4$ | $11+y = 6$

$\boxed{x = 3}$ | $\boxed{y = -5}$

Point $A(3,-5)$

$$\frac{y+5}{x-3} = \frac{5}{8}$$ Complete

21

$$h_1 = \frac{|0+0+10|}{5} = 2 \text{ unit length}$$

$$h_2 = \frac{|0+0+26|}{13} = 2 \text{ unit length}$$

$\because h_1 = h_2$

$\therefore AB = CD$ #

22

$A(7,-1)$, $D(5,y)$, $B(3,-1)$, $C(2,1)$

$$m_1(\overleftrightarrow{AD}) = m_2(\overleftrightarrow{BC})$$

$$\frac{y+1}{5-7} = \frac{1+1}{2-3}$$

$$\frac{y+1}{-2} = \frac{2}{-1}$$

$$-4 = -y-1$$

$\boxed{y = 3}$ $\boxed{D(5,3)}$

eq. of $\overleftrightarrow{BC}$: $\dfrac{y+1}{x-3} = \dfrac{1+1}{2-3}$

$$\frac{y+1}{x-3} = \frac{2}{-1}$$

$$2x-6 = -y-1$$

$$\boxed{2x+y-5=0}$$

$$h = \frac{|2(7)+(-1)-5|}{\sqrt{5}} = \frac{8}{\sqrt{5}}$$

$A = \frac{1}{2}(BC + AD)(h)$ Complete

$= \boxed{12}$ sq. unit

ALGEBRA AND TRIGONOMETRY

(1) Complete:

1) If A = (3 , 5) , B (2 , 1) , C = (-2 , 4) then the surface area of ΔABC equals …… square unit.

2) If A = $\begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix}$ the A^2 = …………

3) (sec x – tan x) (Sec x + tan x) = …………

4) (sin θ – Cos θ$)^2 + 2\sin\theta\cos\theta$ = …………

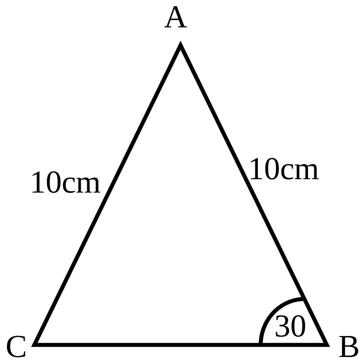
5) The S.S of the inequality 2x – 7 > 5x in R is ………..

6) The area of the circular sector whose arc length is 6cm and the radius length of its circle is 4cm. equals …….... cm^2.

7) in the opposite figure

i) BC = ………..cm

ii) The surface area of Δ ABC = …………cm^2



8) if A^{-1} = $\begin{pmatrix} 5 & -2 \\ -7 & 3 \end{pmatrix}$ then A = …………

9) if $\begin{vmatrix} 2x & 2 \\ 4 & 3 \end{vmatrix}$ = 10 the x = ……….

10) $\sin^2 x + \tan^2 x + \cos^2 x$ = ………

11) The general solution of the equation sin θ = $\frac{1}{2}$ is ……….

12) if tan A + cot A = 3 then $\tan^2 A + \cot^2 A$ = ……….

2- Prove that :

1) $\frac{Cot\ C}{1+cot^2 C}$ = sin C Cos C

2) Sec A – sin A = Cos A Cot A

3) $Sec^2A + Cosec^2\ A = Sec^2A\ Cosec^2A$

4) $Cot^2A - Cos^2A = Cot^2A\ Cos^2A$

5) $\frac{Cos^2 A}{1-sinA}$ =1 + sin A

6) $\frac{1-\ tan^2 A}{1+\ tan^2 A} = 2Cos^2A - 1$

7) $\frac{1}{sin^2(90-\ \theta)}$ - $\tan^2\ \theta = 1$

8) $(\ \sin A - Cos)^2 + (\ \sin A + Cos\ A)^2 = 2$

9) $\frac{1}{1+Cot\ A} = \frac{\tan A}{1+\tan A}$

10)$(\ Sec\ A - \tan\ A\ )^2 = \frac{1-Sin\ A}{1+\sin A}$

11) if sec x – tan x = 6 the sec x + tan x = ……….

12) if sin A + Cos A = $\frac{7}{5}$ the sin A Cos A = ……….

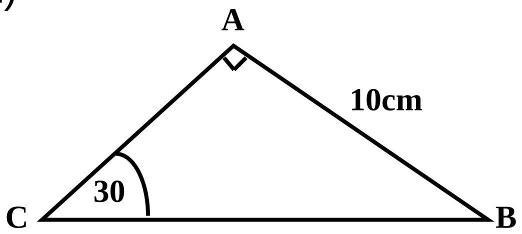
13) the general solution of the equation sin θ = Cos θ is ……….

14) if tan(-θ) = $\sqrt{3}$ = 0 where θ ∈] $\frac{\pi}{2}$, $\frac{3\pi}{2}$[the θ = ……… or ………

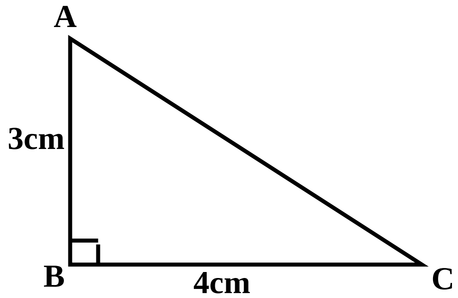
15) if 2 sin θ + $\sqrt{3}$ = 0 , θ ∈] $\frac{\pi}{2}$, $\frac{3\pi}{2}$[then θ = ……………….

3- <u>Solve each of the following triangles:</u>

1)



2)



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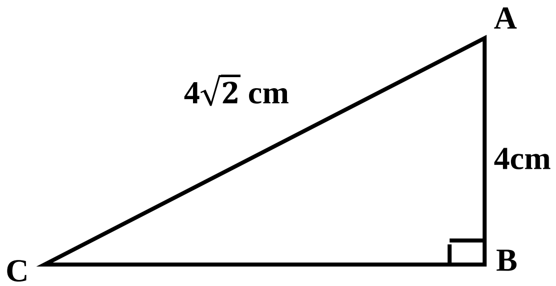

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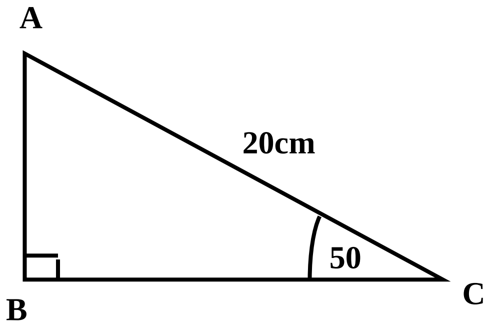
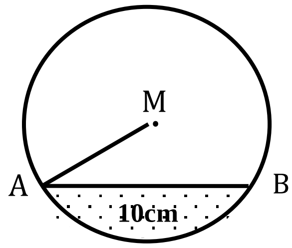
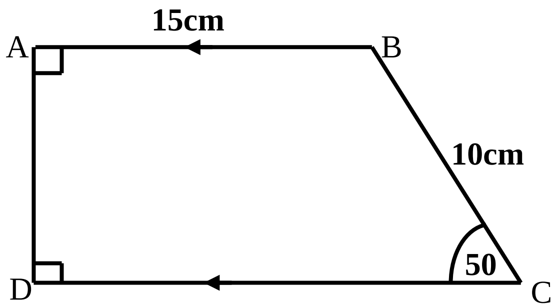


4- In the opposite figure find the length of the radius of the circle.
and the surface area of the shaded part.



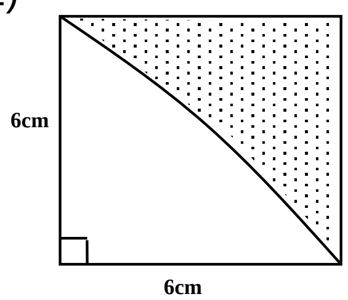
5- In the opposite figure ABCD is a trapezium find the
length of AD and DC.



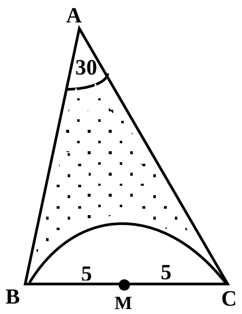
6- Find the area of a circular sector in which the length of its arc is16cm ,
and the length of its radius is 6cm.

7- Find the area of the shaded part in each of the following.

1)



2)



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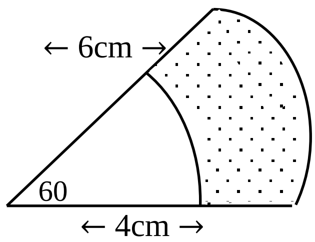

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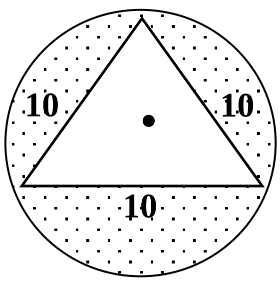
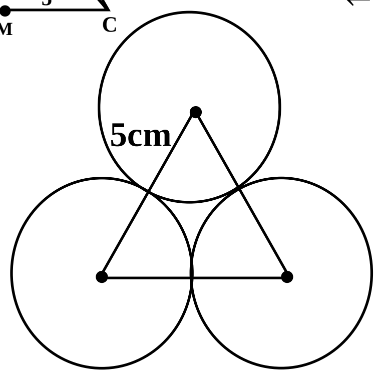


5)



8- if A = $\begin{pmatrix} 3 & 1 \\ 5 & 2 \end{pmatrix}$, B = $\begin{pmatrix} -2 & 1 \\ 4 & -2 \end{pmatrix}$ find AB , BA , (A + B) A

9- if A = (1 2 3) , B = $\begin{pmatrix} 4 \\ 5 \\ 1 \end{pmatrix}$ find if possible AB , BA .

10- if A = $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $(A + B)^T = \begin{pmatrix} 2 & 0 \\ 1 & -1 \end{pmatrix}$ find $A^T B^T$

11- if A = $\begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix}$ and $A^2 - XA + yI = 0$ find X , y where x , y ∈ R

12- if A = (a_{ij}) is a matrix of order 3 x 2 and $a_{ij} = i + 2j$ find A and A^T

13- if A = $\begin{pmatrix} 1 & 4 & x^2+1 \\ 4 & 2 & 3 \\ 5 & 3 & 6 \end{pmatrix}$ is Symmetric matrix find the value of x.

14- Find the area of regular octagon whose side length 8cm. " two nearest to cm ".

15- From the top of a tower of height 60m. the measure of the angle of depression of a car in the same horizontal with its base is $28° 36'$ Find the distance between this car and the base of the tower to the nearest metre.

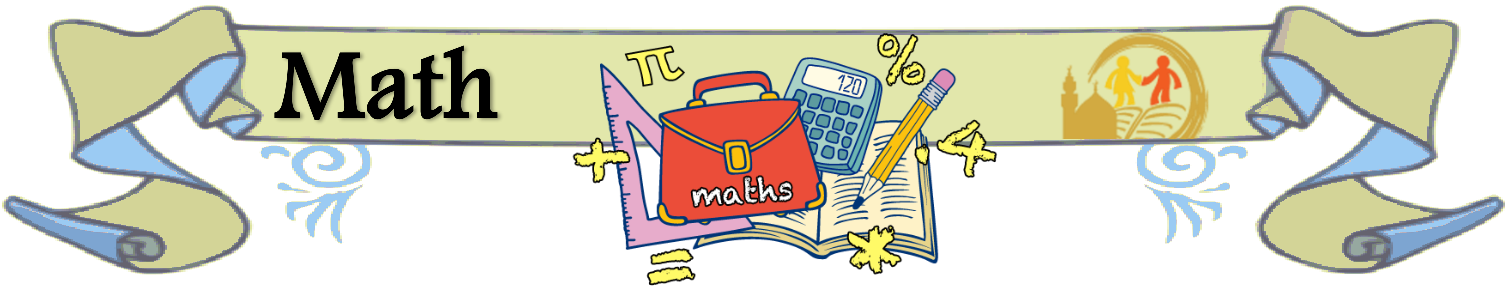
16- Find the area of regular pentagon whose side length is 16 cm.

17- Find the S.S by cramer's method.

$$X + 2y - 3Z = 6 \quad , 2X - y - 4Z = 2 \ , 4X + 3y - 2Z = 14$$

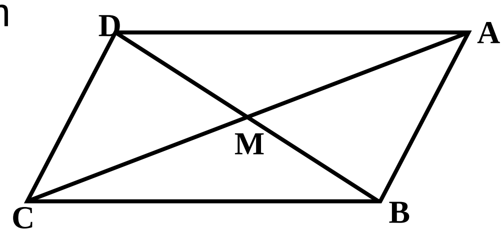
18- From the top of a hilli of height 2.56 km, the measure of angle of depression is $63°$ find the distance between the point and the man to the nearest metre.

19- A man found that the measure of the angle of elevation of plane its height 1000 metre, he found its measure is $25° 17'$ find the distance of the man and plane.



Geometry

1) In the opposite figure ABCD is a parallelogram

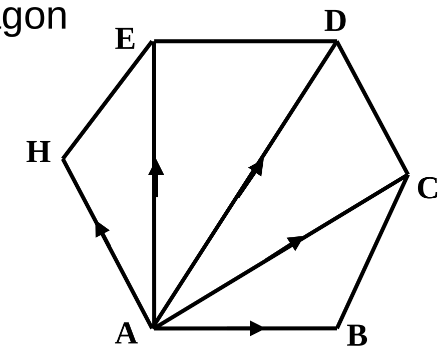


Complete :

1) $\overrightarrow{CM} = \overrightarrow{\dots\dots}$ 2) $\overrightarrow{DA} = \overrightarrow{\dots\dots}$ 3) $-\overrightarrow{AB} = \overrightarrow{\dots\dots}$

4) $\overrightarrow{BM} = \overrightarrow{\dots\dots}$ 5) $\overrightarrow{AC} = \overrightarrow{2\dots\dots}$ 6) $\overrightarrow{MD} = -\frac{1}{2}\overrightarrow{\dots\dots}$

2) In the opposite figure ABCDEH is a regular hexagon



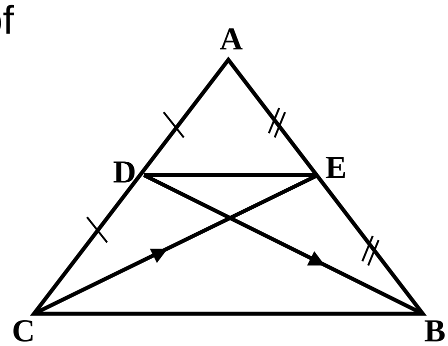
Prove that :

$$\overrightarrow{AB} + \overrightarrow{AC} + \overrightarrow{AD} + \overrightarrow{AE} + \overrightarrow{AH} = 3\,\overrightarrow{AD}$$

3) In the opposite figure E , D are the mid-points of

$\overline{AB}$ and $\overline{AC}$ respectively .

Prove that $\overrightarrow{CE} + \overrightarrow{DB} = \frac{1}{2}\,\overrightarrow{CB}$



4) if A =(3 , -2) , B (6 , 2) , C (1 , 3) and D(4 , 7) find $\|\vec{A} - 3\vec{B}\|$,

$\|\overrightarrow{AB}\|$, $\|\overrightarrow{CD}\|$

5) if A = (5 , $5\sqrt{3}$)write the polar form of $\vec{A}$

6) if A = (10 , 120˚) write the Cartesian form of $\vec{A}$

7) if A = (4 , 300˚) write $\vec{A}$ in terms of $\vec{i}$, $\vec{j}$

8) if A = (2 , -3) , $\vec{B}$ = (-6 , m) find m if

i) $\vec{A} \,//\, \vec{B}$ ii) $\vec{A} \perp \vec{B}$

9) if ABCD is a parallelogram , A(2 , -2) , B(4 ,-2) , C(2 , 3) find the coordinates of the point D and the point of intersection of its two diagonals.

10) if A = (-3 , -7) , B (4 , 0) find the point C which divides $\overrightarrow{AB}$ internally by the ratio 5 : 2

11) if A = (3 , 5) , B (7 , -10) find the point C in which.

1- C $\in \overrightarrow{AB}$, $\frac{CA}{CB} = \frac{2}{3}$

2- C $\in \overrightarrow{AB}$, $\frac{CA}{CB} = \frac{3}{2}$

3- C $\in \overrightarrow{AB}$, $\frac{CA}{AB} = \frac{1}{4}$

12) if A = (3 , -2) , B = (-2 , 3) find the ratio by which

1- C (8 , -7) divides $\overleftrightarrow{AB}$

2- the x-axis divides $\overleftrightarrow{AB}$

3- the y-axis divides $\overleftrightarrow{AB}$

and determine the type of division in each case.

13) ABC is a triangle where A(1 , 2) , B(3 , -1) , C(5 , 5) find the coordinate of the point of intersection of the three medians.

14) if the equation of the straight line L is (2k – 1) x + (3 – k) y – x k + 6 = 0 , find the value of k in each of the following cases.

1) (1 , 2) ∈ L

2) L is parallel to the st. line x + y = 2

3) L is parallel to the x-axis

4) L is parallel to y-axis

15) write the equation of the st. line passes through the point (4 , 3) and

1- the point (1 , 4)

2- parallel to the st. line 2x + y – 10 = 0

3- perpendicular to the st. line $\frac{x}{2} + \frac{y}{3} = 1$

4- make on angle of measure 135˚ with the positive direction of x-axis.

5- cut equal parts from the positive direction of $\overrightarrow{ox}$, $\overrightarrow{oy}$

16) find the surface area of the triangle formed by the st. line 2x + 3y = 12 and the two axis.

17) In Δ ABC , A(3 , 5) , B (7 , 4) , C (-4 , 0) If E is the mid-point of $\overline{BC}$.

Write the equation of the st. line $\overleftrightarrow{AE}$.

18) if A=(5 , -6) , B(3 , 4) find the equation of the axis of symmetry of $\overline{AB}$

19) In Δ ABC , A= (0 , 2) , B = (3 , 1) , C = (-2 , -1) find m ($\hat{A}$)

20) In Δ ABC , A(2 , 3) , B(5 , 7) , C= (1 , 4) find y if m ($\hat{B}$)= 90˚ then find the measure of the other two angles.

21) find the distance between the point (1, 5) and the line passes through the two points (2 , -3) and (2 , -1)

22) Complete:

1- the length of the perpendicular from the point (-3 ,5) and the y-axis is …….

2- the length of the perpendicular from the point (1 ,-4) and the x-axis is …….

3- the length of the perpendicular from the point (0 ,-4) and the st. line is ……

23) Find the equation of the straight line which passes through the point of the intersection of the two straight Lines $3x + 2y = 10$, $5x – 3y – 4 = 0$ and its perpendicular to the straight line $2x + 7y – 4 = 0$

24) If the two forces $F1= 2\vec{i} + 3\vec{j}$, $F2 = a\vec{i} + j$, $F3 = 5\vec{i} + b\vec{j}$ act at point find the value of a , b if the resultant of those forces R.

a) $\vec{R} = 5\vec{i} - 2\vec{j}$ **b)** $\vec{R} = \vec{0}$

25) The two force F1 , F2 act at one point find the value and the direction of their. Resultant if

$F1 = 34\vec{\mathbf{e}}$ in the north east direction

$F2 = 34\vec{\mathbf{e}}$ in the south west direction.

26) Two forces of magnitudes $F1 = 2\vec{i} - 3\vec{i}$, $F2 = 4\vec{i} + 7\vec{i}$, $F3 = 3\vec{i} - \vec{j}$ act at point. Find the resultant and its direction.

27) Find the equation of the straight line which passes through the point (3,1) and the point of intersection of two straight lines $3x + 2y – 7 = 0$, $x + 3y = 7$

28) If $\overrightarrow{V_a} = 120\,\hat{k}$, $\overrightarrow{V_b} = 80\,\hat{k}$ find $\overrightarrow{V_{ba}}$, $\overrightarrow{V_{ab}}$

29) Find the equation of the straight line which passes through the point of intersection of intersection of $\vec{r} = k(-3 , 2)$, $3\vec{x} - 2y = 13$ and parallel to y – axis .

30) Find the equation of the straight line which passes through the point of intersection of the two straight lines $2x + 3y -2 = 0$, $3x – y – 14 = 0$ and makes with the positive direction of X axis positive angle its measure $135°$

Answers

Algebra and trigonometry

Q1:

1) $9\frac{1}{2}$ cm^2

2) $\begin{pmatrix} 13 & 9 \\ 12 & 16 \end{pmatrix}$

3) 1

4) 1

5) $]-\infty\ ,\ \frac{-7}{3}[$

6) 12 cm^2

7) $10\sqrt{3}$ cm , $25\sqrt{3}$ cm^2

8) $\begin{pmatrix} 3 & 2 \\ 7 & 5 \end{pmatrix}$

9) 3

10) $\text{Sec}^2 x$

11) $\theta = \pm 30 + 2n\pi$

12) 1

Q2:

from 1→ 10 prove

11) $\frac{1}{6}$

12) $\frac{1}{5}$

13) θ = 45 + 180n

14) θ = 240

15) $\frac{15}{8}$

Q3:

from 1 → 4

Solve : find the value of each element in Δ by sin , Cos , Tan.

Q4:

r = $\frac{10}{3}\sqrt{3}$ cm

area = 20.5 cm^2

Q5:

AD = 7.7 cm

DC = 21.4 cm

Q6: 72 cm^2

Q7: Solve by yourself.

Q8: $\begin{pmatrix} -2 & 1 \\ -2 & 1 \end{pmatrix}$, $\begin{pmatrix} -1 & 0 \\ 2 & 1 \end{pmatrix}$, $\begin{pmatrix} 15 & 5 \\ 27 & 9 \end{pmatrix}$

Q9: (17) , $\begin{pmatrix} 4 & 8 & 12 \\ 5 & 10 & 15 \\ 1 & 2 & 3 \end{pmatrix}$

Q10: $\begin{pmatrix} -2 & -18 \\ -2 & -26 \end{pmatrix}$

Q11: x = 4 , y = 3

Q12: , A = $\begin{pmatrix} 3 & 5 \\ 4 & 6 \\ 5 & 7 \end{pmatrix}$, A^T = $\begin{pmatrix} 3 & 4 & 5 \\ 5 & 6 & 7 \end{pmatrix}$

Q13: x = ± 2

Q14: 309 cm2

Q15: 110m

Q16: 440cm2

Q17: X = 2 , y = 2 , Z = 0

Q18: **Answer by Yourself**

Q19: **Answer by Yourself**

Geometry

1) $\overrightarrow{MA}$, $\overrightarrow{CB}$, $\overrightarrow{CD}$, $\overrightarrow{3D}$, $\overrightarrow{AM}$, $\overrightarrow{DB}$

2) Prove

3) Prove

4) 5 , 5 , $\sqrt{306}$

5) , **(6** , **(7** Try to solve

8) m = 9 , m = -4

9) D (0 , 3) , (2 , $\frac{1}{2}$)

10) (2 , -2)

11)

1- ($\frac{23}{5}$, 3) 2 , 3 Try to Solve.

12)

1- 1 : 2 ext.

2- 2 : 3 inter

3- 3 : 2 ext.

13) (3 , 2)

14)

1- $k = \frac{11}{7}$

2- $k = \frac{4}{3}$

3- $k = \frac{1}{2}$

4- $k = 3$

15)

1- $x + 3y - 13 = 0$

2- $y + 2x - 11 = 0$

3- $3y - 2x - 1 = 0$

4- $y + x - 6 = 0$

5- $y + x - 6 = 0$

16) 12 sq. units

17) $4y - 3x - 11 = 0$

18) $5y - x + 9 = 0$

19) $m(\angle A) = 74^\circ\ 44'\ 41'$

20) $y = 10$, $55^\circ\ 47'\ 3''$, $34^\circ\ 12'\ 56''$

21) 1 unit

22) Complete

3 units , 4 units , 3 units .

23) $3X + 2y - 10 + K(5X - 3y - 4) = 0$ 1

The slope of $2X + 7y - 4 = 0$

Is $\frac{-2}{7}$

$\therefore$ The slope of the required straight line is $\frac{7}{2}$

From 1

$\therefore 3X + 2y + 10 + 5KX - 3KY - 4K = 0$

$\therefore X(3 + 5K) + y(2 - 3K) - 10 - 4K = 0$

$\therefore X(3 + 5K) + y(2 - 3K) - 10 - 4K = 0$

$\therefore$ Slope $= \frac{3+5K}{2-3K} = \frac{7}{2}$

$K = \frac{20}{11}$ The equation $7X - 2y - 10 = 0$

24) -2 , -6 , -7 , -4

25) $\vec{F} = 34\vec{e} - 34\vec{e} = \vec{0}$

$\therefore$ The body is in equilibrium

26) 15 force unit, 53° 7' 48''

27) $\vec{r} = (3 , 1) + k(2 , -1)$

28) $-40\vec{e}$ $40\vec{e}$

29) $\vec{r} = (3 , -2) + k(0 , 1)$

30) $y + x = 2$